

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

SURPRISE VALLEY GROUND WATER BASIN WATER QUALITY STUDY



JANUARY 1986

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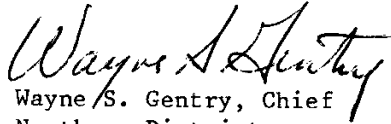
FOREWORD

The principal objective of the investigation leading to this report was to update knowledge of water quality in Surprise Valley Ground Water Basin. The basin encompasses an area of about 370 square miles in eastern Modoc County and contains about 4.0 million acre-feet of ground water in storage to a depth of 400 feet.

The basin's ground water quality has been monitored since 1958, providing information which was particularly helpful in the planning of this study. Basin ground waters have been monitored on a yearly basis by the Department of Water Resources to determine natural variation and detect long-term trends.

Information developed during this investigation is essential not only in managing this water resource to maximize its beneficial uses, but also to plan for future conjunctive ground and surface water uses. It should also be useful to help develop more definitive objectives for water quality control plans.

The report includes a brief overview of the study area, its geology, climate, development, and water supply. It describes the hydrologic conditions that prevail, summarizes water quality data, and sets forth findings and conclusions.


Wayne S. Gentry, Chief
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CONVERSION FACTORS

Quantity	To Convert from Metric Unit	To Customary Unit	Multiply Metric Unit By	To Convert to Metric Unit Multiply Customary Unit By
Length	millimetres (mm)	inches (in)	0.03937	25.4
	centimetres (cm) for snow depth	inches (in)	0.3937	2.54
	metres (m)	feet (ft)	3.2808	0.3048
	kilometres (km)	miles (mi)	0.62139	1.6093
Area	square millimetres (mm ²)	square inches (in ²)	0.00155	645.16
	square metres (m ²)	square feet (ft ²)	10.764	0.092903
	hectares (ha)	acres (ac)	2.4710	0.40469
	square kilometres (km ²)	square miles (mi ²)	0.3861	2.590
Volume	litres (L)	gallons (gal)	0.26417	3.7854
	megalitres	million gallons (10 ⁶ gal)	0.26417	3.7854
	cubic metres (m ³)	cubic feet (ft ³)	35.315	0.028317
	cubic metres (m ³)	cubic yards (yd ³)	1.308	0.76455
	cubic dekametres (dam ³)	acre-feet (ac-ft)	0.8107	1.2335
Flow	cubic metres per second (m ³ /s)	cubic feet per second (ft ³ /s)	35.315	0.028317
	litres per minute (L/min)	gallons per minute (gal/min)	0.26417	3.7854
	litres per day (L/day)	gallons per day (gal/day)	0.26417	3.7854
	megalitres per day (ML/day)	million gallons per day (mgd)	0.26417	3.7854
	cubic dekametres per day (dam ³ /day)	acre-feet per day (ac-ft/day)	0.8107	1.2335
Mass	kilograms (kg)	pounds (lb)	2.2046	0.45359
	megagrams (Mg)	tons (short, 2,000 lb)	1.1023	0.90718
Velocity	metres per second (m/s)	feet per second (ft/s)	3.2808	0.3048
Power	kilowatts (kW)	horsepower (hp)	1.3405	0.746
Pressure	kilopascals (kPa)	pounds per square inch (psi)	0.14505	6.8948
	kilopascals (kPa)	feet head of water	0.33456	2.989
Specific Capacity	litres per minute per metre drawdown	gallons per minute per foot drawdown	0.08052	12.419
Concentration	milligrams per litre (mg/L)	parts per million (ppm)	1.0	1.0
Electrical Conductivity	microsiemens per centimetre (uS/cm)	micromhos per centimetre	1.0	1.0
Temperature	degrees Celsius (°C)	degrees Fahrenheit (°F)	$(1.8 \times ^\circ\text{C}) + 32$ $(^\circ\text{F} - 32)/1.8$	

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INTRODUCTION

The Department of Water Resources conducted an extensive investigation of the ground water basins of northeastern California in the late 1950s. Results were reported in Bulletin 98, "Northeast Counties Ground Water Investigation", February 1963. In conjunction with that investigation, water quality studies were made, which provided a good overview of ground waters in Surprise Valley.

Since then, there has been a large increase in the use of ground water in northeastern California and growing concern over the resultant declining of water levels in wells. The concern for these valuable ground water resources led to a reevaluation of the hydrologic conditions in these northeastern counties' basins, including Surprise Valley, with results being published in the Northern District report "Northeastern Counties Ground Water Update", 1982.

This current study of Surprise Valley ground water quality was undertaken to:

1. Determine the present quality of Surprise Valley ground waters.
2. Evaluate the water quality as it relates to beneficial uses.
3. Detect and evaluate existing water quality problems.

Sanitary surveys and bacteriological sampling were beyond the scope of this investigation and evaluations were based solely on chemical and physical characteristics.

Scope

In the initial phase of the study, historic data were compiled and evaluated. Well logs were reviewed and wells selected for supplemental sampling to improve areal coverage and better define areas with poor quality water. During the summer of 1982 and spring of 1983, wells were located and samples collected for analysis. At the time of field collection, temperature, pH, and electrical conductivity (EC) measurements were made. Selected samples were then delivered to the Department's chemical laboratory in Bryte for more detailed analysis.

Analyses received from the laboratory were checked and put into the Department's Water Data Information System. Results were used to evaluate the present ground water quality and relate this to the historic quality. Water quality problems were identified by comparing the quality with criteria related to major beneficial uses. Data developed from the Department's ground water quality monitoring program provided information on the change of quality with time.

This report includes a description of the methods used in the investigation, an evaluation of the present ground water quality, a description of water quality problem areas, and information on water quality changes. Findings and conclusions are included. All data developed during this investigation, along with historic departmental data, are included in the appendices.

Area of Investigation

Surprise Valley is located in eastern Modoc County, northeastern California, as shown in Plate 1. Surprise Valley is situated to the east of the Warner Mountain Range, along the California-Nevada border. The valley extends 50 miles in a north-south direction, ranges up to 12 miles in width, and lies at an elevation of nearly 4,500 feet. This ground water basin with an area of 370 square miles has a contributory watershed area of about 930 square miles. It is an internally draining basin which contains three lakes--Upper, Middle, and Lower Alkali Lakes. These lakes are shallow, salty, and frequently dry during the summer months.

Geology

Surprise Valley is on the northwestern edge of the Intermontaine Basin and Range geomorphic province. The province itself extends from the Sierra-Nevada to the Rockies, and from southeastern Oregon to southeastern California. Surprise Valley is bounded by the basaltic volcanics of the Columbia Plateau on the west (a portion of which is known locally as the Modoc Plateau).

Surprise Valley is an elongated fault depression bounded by uplifted, tilted mountain ranges. The valley and its surrounding mountains are crossed by numerous faults with many extending into water-bearing materials. The characteristics of the Surprise Valley geologic formations are briefly described in Figure 1. Of these, the principal water-bearing formations are the nearshore deposits and Recent valley sediments. Underlying bedrock has been broken into many tilted fault blocks, resulting in a bedrock surface which ranges from a few hundred feet to over 5,000 feet below the floor of the valley.

The most prominent structural feature in Surprise Valley is the Surprise Valley fault. It extends from near Fort Bidwell southerly along the base of the Warner Mountains for about 60 miles. There is evidence that over 5,000 feet of vertical displacement has occurred along this fault, creating a rugged fault scarp at the eastern front of the Warner Mountains.

Another major structural break is the Lake City fault which runs in a northwest-southeast direction along the south end of Upper Alkali Lake from the Surprise Valley fault on the west into Nevada on the east.

A more detailed and comprehensive discussion of the Surprise Valley geology is presented in Bulletin 98 and the locations of prominent faults are shown on Plate 21 of that bulletin.

FIGURE 1

FIGURE

GEOLOGIC FORMATIONS IN SURPRISE VALLEY

GEOLOGIC AGE		GEOLOGIC FORMATION	STRATIGRAPHY	APPROXIMATE THICKNESS IN FEET	PHYSICAL CHARACTERISTICS	WATER-BEARING CHARACTERISTICS	
CENOZOIC	QUATERNARY	RECENT	SAND DUNES	Qsd	0-30	Qsd: Unconsolidated, wind-blown sand.	Highly permeable. Located above water table; acts to recharge underlying materials. Yields little water.
			SAND & SILT DEPOSITS	Qs	0-20		
			LAKE DEPOSITS	Ql	0-5000		
			BASIN DEPOSITS	Qb	0-50		
			INTERMEDIATE ALLUVIUM	Qoi	0-50		
		PLEISTOCENE	ALLUVIAL FANS	Qf	0-1000	Qs: Unconsolidated, wind-blown sand and silt; alkali often present. Ql: Unconsolidated to semi-consolidated clay, organic muck, and fine sand. Alkali and salt present.	Permeable but contains little water due to being above water table. Generally nearly impermeable. Contains small amounts of confined water in stringers of fine sand.
			NEAR-SHORE DEPOSITS	Qps	0-5000	Qb: Unconsolidated deposits of sand, silt, clay, and organic muck. Qal: Unconsolidated sand and silt with some gravel and clay lenses. Qf: Unconsolidated to partly consolidated, poorly stratified gravel, sand, and silt with clay lenses. Qps: Poorly consolidated gravel, sand, and silt deposited as deltas and terraces.	Permeability generally low, but locally may be sufficiently permeable to yield small amounts of water to shallow wells. Moderately permeable; yields moderate amounts of water to wells. Generally highly permeable. Important west side aquifer; yields abundant supplies of free and confined water. Moderate to high permeability. Yields large quantities of free and confined water.
			MORAINES	Qpm	0-200(?)	Qpm: Unconsolidated mixture of boulders, gravel, silt, clay, and rock flour.	Low permeability. May yield minor amounts of water to springs.
			PLIO-PLEISTOCENE BASALT	TQvb	0-300	TQvb: Highly jointed vesicular basalt flows.	Permeability ranges from low to high. Acts to recharge sediments in Surprise Valley. May yield moderate amounts of water to wells.
			RHYOLITE	Tvr	?	Tvr: Fractured flows and shallow intrusives of pale-colored rhyolite.	Essentially impermeable.
	TERTIARY	MIOCENE THROUGH PLIOCENE	BASALT	Tmva	1500	Tmva, Tmva, Tmvp: Jointed vesicular basalt flows, flows of platy andesite, and beds of rhyolite tuff.	Permeability ranges from poor to moderate. Basalt acts as recharge area. May locally yield moderate amounts of water to wells. Andesite and pyroclastic rocks are essentially impermeable.
			ANDESITE	Tmva			
			PYROCLASTIC ROCKS	Tmvp			
		MIOCENE	FORTY-NINE CAMP FORMATION	Tmfc	750 ?	Tmfc: Consolidated tuffaceous sand and volcanic gravel.	Moderate permeability. Certain beds may yield moderate amounts of water to wells.
			CEDARVILLE SERIES	Tmc	7500	Tmc: Massive tuff-breccias and tuffs. Includes flows of Miocene basalt and andesite. Also includes some tuffaceous sediments correlative with Forty-nine Camp formation.	Essentially impermeable.
	TERTIARY	MIOCENE	DEEP CREEK CONGLOMERATE	Tcdc	?	Tcdc: Massive, consolidated conglomerate with beds of shale, mudflows, and tuff.	Essentially impermeable.

Climate

Surprise Valley's climate can be classified as semi-arid with cold winters and warm, dry summers. The major factors affecting the climate of northeastern California are its inland situation and the orographic rainfall pattern of California.

Moisture-laden air moves into California from the northern Pacific Ocean in an easterly direction. As the air rises over and crosses the Coast Ranges, it loses much of its moisture. Moisture is further removed from the air masses as they continue eastward across California's Cascade Ranges and, finally, across the Warner Mountain Range. The air that comes down the leeward side of the Warners into Surprise Valley therefore is quite dry.

Approximately 70 percent of the total precipitation Surprise Valley receives occurs between December and April. Most of this is in the form of snow. The mean annual precipitation at Cedarville is about 13.9 inches. Heaviest precipitation occurs in the month of December, with a mean accumulation of 2.7 inches. The driest month is September, with a mean accumulation of 0.02 inches.

Surprise Valley generally has cold winters and hot summers. Normal low temperature for both the Fort Bidwell and Cedarville areas is 28.9 degrees F, occurring in January. Normal high temperature for Fort Bidwell is around 68.5 degrees F, while normal highs for Cedarville are around 73 degrees F. High temperatures for both places normally occur in July. Surprise Valley's mean frost-free period is generally from the end of May to mid-September.

Development

The major land use in Surprise Valley is agriculture. Alfalfa and meadow hay are the major crops, but a small acreage is devoted to grain and other crops. Cattle production contributes significantly to the agricultural economy. Using deep wells for a water supply, many additional acres of irrigated alfalfa and meadow hay land have been brought into production during the past few years.

There are four settlements in Surprise Valley: Cedarville, Fort Bidwell, Lake City, and Eagleville. These serve as service and supply centers for the residents of Surprise Valley. The largest of these four is Cedarville, with a population of about 800. This is 57 percent of the total Surprise Valley population, which is about 1,400.

Located in the center of the valley, just west of Middle Alkali Lake, Cedarville has a hospital and is the primary service and supply center for the entire valley. It is at the intersection of two major local routes; State Highway 299 and the main north-south artery for Surprise Valley, Surprise Valley Road. Because of this location, Cedarville serves as a tourist stop from whence one can visit other sites in the valley. The two highways also provide avenues for movement of products in and out of the valley.

Water Supply

The mean annual unimpaired runoff in the Surprise Valley drainage basin is about 160,000 acre-feet. The water Supply is derived almost entirely from snowmelt runoff, with only minor spring-fed flows occurring in the latter part of the season. More than 70 percent of the surface water runoff usually occurs during the four-month period of March through June each year. The numerous streams that drain from the Warner Mountains provided most of the water in the early years of development, but as water demands increased summer flows became insufficient. Resulting conflicts over water led to water rights adjudications and watermaster service for ten streams in the valley.

As surface water storage sites are very limited, water demands have been increasingly met by extraction of ground water. By 1974 about 30 percent of the water demand was being supplied by ground water and that percentage had increased in 1980 to 41 percent. Any new water demands will probably have to be met by conservation and additional development of ground water.

Waste Discharge

In Surprise Valley the only point source waste discharge is that of the Fort Bidwell Indian Reservation. Other domestic wastes are disposed of through individual septic tanks and leachlines at scattered locations throughout the valley. As populations have remained low, domestic wastes have probably had limited impact on the mineral quality of the waters.

Nonpoint sources associated with agriculture (fertilizers, barnyard effluent, return irrigation flows, etc.) have probably had a greater impact on quality of water resources than point sources in Surprise Valley at this time. These are not known to have resulted in any major water quality problems.

HYDROLOGY

The hydrology of the Surprise Valley Basin is influenced by the seasonal distribution of rainfall, diverse seasonal temperatures, snowmelt, its geologic structure and geographic setting, evaporation, and the use of surface and ground waters.

Precipitation

Although the mean annual precipitation along the crest of the Warner Mountains approaches 35 inches, the mean annual precipitation in the vicinity of Cedarville is only about 14 inches. Even less precipitation falls on the eastern portion of the basin and it is considered to be semiarid. Heaviest precipitation occurs in December and most in the form of snow. Mean annual snowfall at the Cedarville station is about 52 inches. The snowpack melt usually occurs in late spring.

Surface Water

Numerous small streams drain the eastern slopes of the Warner Mountains and carry their annual water crop to the valley floor. These streams not only provide water for diversion and direct use but are a major source of ground water recharge. During March through June snowmelt frequently causes peak flows in these streams that carry waters into the three Alkali Lakes which at times cover much of the valley floor. The Alkali Lakes are shallow, saline, and frequently dry during the summer months.

Ground Water

The total ground water storage capacity in Surprise Valley Ground Water Basin to a depth of 400 feet has been estimated to be about 4,000,000 acre-feet. How much of this quantity is usable or how much usable storage exists below 400 feet is not presently known. In recent years ground water has been used in increasing amounts to meet the growing demands in the basin. Since 1957 the number of irrigation wells has more than doubled, increasing from 58 to more than 120.

Occurrence

The principal water-bearing formations in Surprise Valley are Pleistocene nearshore deposits and the Recent valley sediments (see Figure 1). The nearshore deposits occur as highly permeable terraces, beaches, spits, and deltas formed in the ancient Lake Surprise. They are usually less than 300 feet in thickness. Where exposed at the surface they are important as recharge areas. When saturated they are important water-bearing materials, capable of yielding large amounts of water to wells.

Recent valley sediments include alluvial fans, intermediate alluvium, and basin deposits. Alluvial fans may be as much as 1,000 feet in thickness

and are the principal aquifers in the valley. These aquifers are capable of yielding large quantities of confined and semiconfined ground water. The alluvial fans along the west side of the valley at the base of the Warner Mountains comprise the most important recharge areas in the basin.

Intermediate alluvium is located between the alluvial fan and basin deposits. These deposits are not over 50 feet in thickness and generally have only moderate permeability. They yield moderate amounts of water to shallow wells.

Basin deposits that occur in the flat portion of the valley are not over 50 feet thick and generally have low permeability. Locally they may have sufficient permeability to yield small amounts of water to shallow wells.

The lake deposits which underlie the central portion of the valley generally have very low permeabilities and yield only small amounts of ground water.

Movement

Ground water movement in the basin generally follows the surface topography with water moving from the peripheral areas to the central portion of the valley floor. Most of the ground water recharge occurs through the alluvial fans which form the western side of the valley. Recharge water entering the fans along the western edge of the basin move easterly toward the Alkali Lakes through the areas of heaviest ground water extraction.

Levels

Ground water level measurements in Surprise Valley wells show that ground water depths are usually less than 50 feet below ground surface in the spring and usually less than 100 feet below ground surface in the fall. Throughout the valley there has been a general decline in water levels since 1972 which is probably due to a combination of factors including increased pumpage, changes of conditions in recharge areas, and surface water runoff patterns. Some west side streams have been rechannalized and straightened for flood control purposes. However, this has reduced recharge potential.

The greatest decline has occurred in the Cedarville area where an average decline of about 30 feet occurred between 1972 and 1982. To the south in the Eagleville area a decline of about 18 feet was measured, while to the north near Fort Bidwell a decline of about 3 feet was recorded for the same period. As ground water use increases in the valley, greater seasonal variations in water levels can be expected with additional declining of water levels in some areas.

WATER QUALITY

To determine the present quality of Surprise Valley ground water, sampling surveys were conducted in the summer of 1982 and spring of 1983. The Department of Water Resources' regular monitoring program wells were included so that present quality could be evaluated in relation to historic variation. The following sections present information on the water quality parameters, sampling and analytical procedures, and water quality criteria.

Water Quality Parameters

The suitability of ground water for beneficial use can be determined by its quality, which can be derived from a study of its chemical and physical characteristics.

Chemical

Precipitation, as it reaches the earth, is an excellent solvent. It contains dissolved gases, such as carbon dioxide and oxygen, but normally contains few dissolved solids. As water passes through the hydrologic cycle, either on the surface or through the ground, it dissolves minerals from the materials it contacts. The amount and type of minerals dissolved reflect the composition of these materials and the hydrologic and geologic conditions governing the rate of water movement. Often, more salts and pollutants are added by sewage, industrial wastes, and irrigation return flows. These dissolved substances can determine water's suitability for various beneficial uses.

A measure of the overall chemical quality can be obtained by determining and summing the concentrations of individual ions in a water. A measure of the total dissolved solids (TDS) can also be obtained by filtering a water sample, drying it, and weighing the residue. A third technique measures the electrical conductivity (EC) of the water sample, as that value can be related to the ionic content of the water. Ions commonly found in natural waters and most often looked for in laboratory analysis include calcium, magnesium, sodium, potassium, bicarbonate, carbonate, sulfate, chloride, and boron. Each of these is important to one or more beneficial uses.

Another important chemical factor is pH, which is a measure of the water's acidity (hydrogen ion content). The pH scale ranges from 0 to 14, with a value of 7 being neutral. Most natural waters have a pH in the 6.5 to 8.5 range, while an acid, such as lemon juice, has a pH of about 2, and household ammonia has a pH of about 12.

Alkalinity is a measure of a water's ability to withstand changes in pH and is due to the carbon dioxide, bicarbonate, and carbonate equilibrium in the water. The buffering action of this equilibrium is important because it dampens pH fluctuations that might occur due to waste discharges or intense algal growth. It also serves as a source of inorganic carbon for plant growth.

Water contains varying amounts of certain elements which are essential to biologic productivity and are referred to as nutrients. Such metals as

iron, copper, molybdenum, etc., are needed in trace amounts and are called micronutrients. Carbon, nitrogen, and phosphorus are needed in larger quantities and are referred to as macronutrients. The two elements most often considered limiting to primary productivity in aquatic systems (if there were more of that element present, there would be more growth) are nitrogen and phosphorus.

Nitrogen is found in water in the form of nitrate, nitrite, and ammonium ions, ammonia gas, or as part of nitrogen-bearing organic compounds. Nitrate is the form most commonly found in ground water.

Phosphorus is found in water as orthophosphates, polyphosphates, and organic phosphorus. Most forms are converted in nature to orthophosphates by bacterial action or hydrolysis, and this is the form used by organisms. Both orthophosphate and total phosphorus levels are generally included in nutrient determinations.

Physical

Temperature, color, and odor are important physical characteristics of water. Temperature greatly influences the suitability of water for many beneficial uses. It affects the solubility of gases, and other substances in water, water density, and its viscosity. Color and odor characteristics affect the potability of water and are important to its domestic use.

Sampling and Analytical Methods

Ground water samples were collected during this study in sample-rinsed plastic bottles. Samples were collected from taps at the wells or from the nearest possible point in the distribution systems. Whenever possible, samples were collected from systems when pumps had been operating for a period of time so that its quality would represent the well's source aquifer. Temperature, pH, and EC measurements were made at the time of sampling, and additional samples were collected for analyses at the Department's chemical laboratory in Bryte.

Temperatures were measured with standard field thermometers whose calibrations had been checked in the laboratory.

Field pH was determined by using Hellige Comparitors with appropriate indicator solution and disk. Laboratory pH's were also measured in selected samples with a calibrated glass electrode-type pH meter.

Electrical conductivity was measured on portable Beckman solubridges that had been calibrated on known solutions. Selected samples that were sent to the laboratory also had EC determinations made for quality control.

Samples collected for standard mineral or special constituent determinations were transported to the Bryte Laboratory for analysis. Table 1 lists the standard methods used at that laboratory.

Trace metal samples were collected in special acid-rinsed plastic bottles. Double distilled nitric acid was added to reduce the pH to 3 and samples were transported to the laboratory.

TABLE 1
ANALYTICAL METHODS
FOR WATER QUALITY PARAMETERS

<u>Parameter</u>	<u>Method</u>
Electrical Conductivity	Beckman Wheatstone Bridge
Total Hardness	Ca, Mg Atomic Absorption Spectrophotometric
Sodium	Atomic Absorption Spectrophotometric
Potassium	Atomic Absorption Spectrophotometric
Sulfate	Gravimetric - AWWA
Chloride	Automated Ferricyanate Method
Boron	Carminic - AWWA
Arsenic	Silver Diethyl - AWWA
Barium	Atomic Absorption Spectrophotometric
Cadmium	Atomic Absorption Spectrophotometric
Chromate	Atomic Absorption Spectrophotometric
Copper	Atomic Absorption Spectrophotometric
Iron	Atomic Absorption Spectrophotometric
Lead	Atomic Absorption Spectrophotometric
Manganese	Atomic Absorption Spectrophotometric
Zinc	Atomic Absorption Spectrophotometric
Mercury	Cold Vapor Atomic Absorption - EPA
Dissolved Nitrate	Automated Cadmium Reduction
Total Ammonia	Automated Phenate
Total Organic Nitrogen	Block Digestor Phenate
Dissolved Phosphate	Automated Ascorbic Acid
Total Phosphate	Block Digestor Ascorbic Acid

Water Quality Criteria

As the two major beneficial uses of ground water in this basin are domestic and agriculture, water quality criteria for each were used in the water quality evaluations.

Criteria presented in the following sections have been utilized in the evaluations. Except for the constituents that are considered toxic to humans, the concentrations included in the criteria should be considered as suggested limiting values. A water that contains constituent concentrations exceeding these values need not be eliminated from consideration as a source of supply, but should be used with caution and other sources of better quality water should be investigated.

Domestic and Municipal Water Supply

The criteria used in this report for evaluating ground water for domestic use are those included in the State of California domestic water regulations for chemical and physical quality.

Water containing contaminants exceeding the maximum contaminant levels shown in Tables 2, 3, and 4 presents a risk to the health of humans when continually used for drinking or culinary purposes.

TABLE 2

MAXIMUM CONTAMINANT LEVELS FOR DRINKING WATER

INORGANIC CHEMICALS

<u>Constituent</u>	<u>Maximum Contaminant Level, mg/L</u>
Arsenic	0.05
Barium	1.0
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as NO ₃)	45.0
Selenium	0.01
Silver	0.05

TABLE 3

MAXIMUM CONTAMINANT LEVELS FOR DRINKING WATER

ORGANIC CHEMICALS

<u>Constituent</u>	<u>Maximum Contaminant Level, mg/L</u>
(a) Chlorinated Hydrocarbons	
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
(b) Chlorophenoxys	
2, 4 - D	0.1
2,4,5 - TP Silvex	0.01

TABLE 4

LIMITING CONCENTRATIONS FOR FLUORIDE
FOR DRINKING WATER

<u>Annual Average of Maximum Daily Air Temperature</u>		<u>Fluoride Concentration, mg/L</u>			
<u>Degrees Fahrenheit</u>	<u>Degrees Celsius</u>	<u>Lower</u>	<u>Optimum</u>	<u>Upper</u>	<u>Maximum Contaminant Level</u>
53.7 and below	12.0 and below	0.9	1.2	1.7	2.4
53.8 to 58.3	12.1 to 14.6	0.8	1.1	1.5	2.2
58.4 to 63.8	14.7 to 17.6	0.8	1.0	1.3	2.0
63.9 to 70.6	17.7 to 21.4	0.7	0.9	1.2	1.8
70.7 to 79.2	21.5 to 26.2	0.7	0.8	1.0	1.6
79.3 to 90.5	26.3 to 32.5	0.6	0.7	0.8	1.4

Water containing substances exceeding the maximum contaminant levels shown in Tables 5 and 6 may be objectionable to an appreciable number of people, but is not generally hazardous to health.

TABLE 5

CONSUMER ACCEPTANCE LIMITS
SECONDARY DRINKING WATER STANDARDS

<u>Constituents</u>	<u>Maximum Contaminant Levels</u>
Color	15 Units
Copper	1.0 mg/L
Corrosivity	Relatively low
Iron	0.3 mg/L
Manganese	0.05 mg/L
Odor - Threshold	3 units
Foaming Agents (MBAS)	0.5 mg/L
Turbidity	5 units
Zinc	5.0 mg/L

TABLE 6

MINERALIZATION
SECONDARY DRINKING WATER STANDARDS

<u>Constituent, Units</u>	<u>Maximum Contaminant Levels</u>		
	<u>Recommended</u>	<u>Upper</u>	<u>Short Term</u>
Total Dissolved Solids, mg/L or	500	1,000	1,500
Specific Conductance, micromhos	900	1,600	2,200
Chloride, mg/L	250	500	600
Sulfate, mg/L	250	500	600

Water Quality for Agriculture

Prior to 1974, the Department of Water Resources used water quality criteria for the suitability of water for irrigation, which had been developed by the University of California, and classified waters into three groups: Class I (excellent to good), Class II (good to injurious) and Class III (injurious to unsatisfactory). As these criteria were used, it became apparent that they were too general and not applicable in some instances.

To provide improved criteria, a University of California Committee of Consultants formulated a group of guidelines for the interpretation of water quality for agriculture in the early 1970s. These 1970 guidelines have been used by the Department of Water Resources since that time and were used during this investigation. These guidelines are summarized in Table 7 and the complete guidelines are presented in Appendix A.

TABLE 7

<u>PROBLEMS AND RELATED CONSTITUENT</u>	<u>WATER QUALITY GUIDELINES</u>		
	<u>No Problem</u>	<u>Increasing Problems</u>	<u>Severe Problems</u>
<u>Salinity^{1/}</u>			
EC _w of irrigation water, in millimhos/cm	<0.75	0.75-3.0	>3.0
<u>Permeability</u>			
EC _w of irrigation water, in mmho/cm	>0.5	<0.5	<0.2
adj.SAR ^{2/}	<6.0	6.0-9.0	>9.0
<u>Specific Ion Toxicity^{3/}</u>			
<u>from ROOT absorption</u>			
Sodium (evaluate by adj.SAR)	<3	3.0-9.0	>9.0
Chloride (me/L)	<4	4.0-10	>10
(mg/L or ppm)	<142	142-355	>355
Boron (mg/L or ppm)	<0.5	0.5-2.0	2.0-10.0
<u>from FOLIAR absorption^{4/} (sprinklers)</u>			
Sodium (me/L)	<3.0	>3.0	--
(mg/L or ppm)	<69	>69	--
Chloride (me/L)	<3.0	>3.0	--
(mg/L or ppm)	<106	>106	--
<u>Miscellaneous^{5/}</u>			
NH ₄ -N mg/L			
or for sensitive crops	<5	5-30	>30
No ₃ -N ppm			
HCO ₃ (me/L)	<1.5	1.5-8.5	>8.5
(mg/L (only with overhead sprinklers)	<90	90-520	>520
or			
ppm)			
pH	normal range = 6.5-8.4 --		

Footnotes to this table appear on page 16.

- 1/ Assumes water for crop plus needed water for leaching requirement (LR) will be applied. Crops vary in tolerance to salinity. Refer to tables for crop tolerance and LR. (mmho/cmX640 = approximate total dissolved solids (TDS) in mg/L or ppm; mmhoX1000 = micromhos).
- 2 adj.SAR (Adjusted Sodium Adsorption Ratio) is calculated from a modified equation developed by U. S. Salinity Laboratory to include added effects of precipitation or dissolution of calcium in soils and related to CO₃ + HCO₃ concentrations.

To evaluate sodium (permeability) hazard:

$$\frac{\text{Na}}{\sqrt{\frac{\text{Ca} + \text{Mg}}{2}}} [1 + (8.4 \text{ pHc})]$$

pHc is a calculated value based on total cations. Ca + Mg, and CO₃ + HCO₃. Calculating and reporting will be done by reporting laboratory.

NOTE: NA, CA+MG, CO₃+HCO₃ should be in me/L.

Permeability problems, related to low LC or high adj.SAR of water, can be reduced if necessary by adding gypsum. Usual application rate per acre-foot of applied water is from 200 to about 1,000 lbs. (234 lbs of 100% gypsum added to 1 acre-foot of water will supply 1 me/L of calcium and raise the EC_w about 0.1 mmho.) In many cases a soil application may be needed.

- 3/ Most tree crops and woody ornamentals are sensitive to sodium and chloride (use values shown). Most annual crops are not sensitive (use salinity tolerance tables). For boron sensitivity, refer to boron tolerance tables.
- 4/ Leaf areas wet by sprinklers (rotating heads) may show a leaf burn due to sodium or chloride absorption under low humidity, high-evaporation conditions. (Evaporation increases ion concentration in water films on leaves between rotations of sprinkler heads.)
- 5/ Excess N may affect production or quality of certain crops, e.g. sugar beets, citrus, avocados, apricots, grapes, etc. (1 mg/L NO₃-N = 2.72 lbs, N/acre-foot of applied water.) HCO₃ with overhead and sprinkler irrigation may cause a white carbonate deposit to form on fruit and leaves.

<u>Symbol</u>	<u>Name</u>	<u>Symbol</u>	<u>Name</u>	<u>Equiv.</u> <u>Wt.</u>
EC _w	Electrical Conductivity of water	Na	Sodium	23.00
mmho/cm	millimho per centimeter	Ca	Calcium	20.04
	less than	Mg	Magnesium	12.16
	more than	CO ₃	Carbonate	30.00
mg/L	milligrams per liter	HCO ₃	Bicarbonate	61.00
ppm	parts per million	NO ₃ -N	Nitrate-nitrogen	14.00
LR	Leaching Requirement	Cl	Chloride	35.45
me/L	milliequivalents per liter			
TDS	Total Dissolved Solids			17.1 ppm = 1 grain per gallon

STUDY RESULTS

During this study of Surprise Valley ground water, current well and quality data were combined with historic data to get a better understanding of water quality and detect changes that may have occurred. Well data used in this study are presented in Appendix B. Both current and historic water quality data have been included in Appendices C and D. Each well has been numbered according to the California State Well Numbering System and data in the appendices are listed by that number. All data have also been entered in the Department of Water Resources' data storage and retrieval system (WDIS) so that it is available for dissemination and updating.

The well numbering system uses the township, range, and section subdivisions of the Public Land Survey as its base. Each section is then divided into sixteen 40-acre tracts, lettered as follows:

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Well Number
40N/16W-17K1M

Wells are numbered within each 40-acre tract according to the chronological sequence in which they have been assigned California State well numbers. For example, a well which has the number 40N/16W-17K1M would be in Township 40 North, Range 16 West, Section 17 of the Mount Diablo (M) Base and Meridian. K1 further designates it as the first well assigned a State well number in Tract K. The location of the wells utilized in this study are shown on Plate 1.

Water Quality Characteristics

Surprise Valley ground waters are generally of good mineral quality with total dissolved solids (TDS) contents ranging from less than 100 to about 560 milligrams per litre (mg/L). Analyses indicate that the well waters have a median TDS concentration of about 175 mg/L. However there are a group of thermal springs and wells which are poor in quality and have TDS contents ranging from about 1,000 to 1,800 mg/L. Electrical conductivity (EC) of 185 well waters ranged from 75 to 810 micromhos per centimetre at 25 degrees C (mhos/cm) with a median of 240 mhos/cm. The group of 14 poorer quality ground waters had EC values that ranged from 1,200 to 2,510 mhos/cm. The poorer quality waters were generally thermal and most have temperatures exceeding 120 degrees F.

The wells and springs that produce the poorer quality waters are located along known or suspected geologic faults. Most are associated with the Surprise Valley or Lake City faults.

A comparison of historic and recent EC records showed no discernible basin-wide trend of change. Of the 28 wells having long-term water quality records, 7 had records that showed no change. Records indicated that EC levels had increased in 12 wells while they had decreased in 9. These changes are in the range of those that should be expected in a basin that is experiencing ground water development and has areas of poor quality water.

Surprise Valley ground waters are calcium bicarbonate in the recharge areas along the western edge of the basin. As they move easterly they shift in character and sodium becomes the predominant cation. The poorer quality thermal waters that are found along some of the fault zones are usually sodium sulfate or sodium sulfate chloride in character.

Alkalinity and pH

Alkalinity levels in Surprise Valley ground waters when expressed as calcium carbonate ranged from 42 to 515 mg/L with a median concentration of 107 mg/L. Measurements of pH ranged from 6.4 to 9.4 with a median value of 7.8. Alkalinity levels are within the expected range for good quality bicarbonate waters and should provide buffering against sudden pH impacts. The range of pH values found in this basin's ground waters is unusually large, but only 4 sources out of 147 produced water with pH levels below 7 and only 5 had levels exceeding 9. Some of the waters with the lower pH's can be expected to be very corrosive while those with the highest pH's are probably scale forming.

Chlorides

Chloride levels in Surprise Valley ground waters are usually very low. Although chloride concentrations in 160 ground water sources varied from 0 to 379 mg/L; the median value was only 3 mg/L. Only 21 sources contained concentrations that exceeded 30 mg/L and only 1 exceeded 250 mg/L. Most of the ground waters with these higher concentrations of chlorides are thermal.

Sulfates

Sulfate concentrations are quite variable in Surprise Valley ground waters. In 131 ground water sources, concentrations ranged from 0 to 392 mg/L with a median value of 6 mg/L. The highest concentrations were found in thermal wells and springs associated with the Lake City fault. Fourteen ground waters contained sulfate concentrations in excess of 100 mg/L while eight had concentrations exceeding 250 mg/L.

Hardness

Surprise Valley ground waters range in hardness from 0 to 338 mg/L (expressed as calcium carbonate) with a median of 75 mg/L. Most of these waters are considered soft; however, there are five wells scattered throughout the basin that produce waters which have hardness exceeding 200 mg/L and are considered to be very hard.

Sodium Adsorption Ratio

The Adjusted Sodium Adsorption Ratio (ASAR) is a useful factor in evaluating the hazard related to changes in soil permeability and resultant salt build up caused by high concentrations of sodium in irrigation water. Levels above three can cause increasing problems and levels greater than nine can cause severe problems. ASAR values for 184 ground waters in Surprise Valley range from 0 to 70.8 and have a median of 1.5. Nineteen wells have values exceeding nine. These ground waters are usually thermal and are located along known or suspected faults.

Boron

Boron appears to pose no widespread problems in Surprise Valley ground water. The boron concentration in 166 ground waters ranged from 0 to 7.3 mg/L with a median concentration of 0.2 mg/L. Twelve wells produce water containing boron in excess of 2 mg/L. These high concentrations were found in the thermal areas along the faults.

Fluorides

In Surprise Valley ground waters, fluoride concentrations are usually within recommended limits. Analyses of 143 ground water sources show concentrations ranging from 0 to 6.4 mg/L with a median value of 0.2 mg/L. Thirteen ground water sources produced water containing fluorides at concentrations exceeding 2.4 mg/L. The highest concentrations were found in the thermal springs associated with the major fault systems.

Nitrates

Nitrate concentrations in the valley ground waters are low. Data from 125 ground water sources showed levels well below the limit of 45 mg/L recommended for domestic use. Nitrate concentrations ranged from 0 to 19 mg/L with a median value of 0.2 mg/L.

Suitability for Beneficial Use

Though the ground water quality in Surprise Valley is generally good, there are localized problems that are limiting the water's beneficial uses. Most of the poorer quality waters are from thermal wells and springs located along the Surprise Valley and Lake City faults. Water quality problems associated with these ground waters include high: EC, ASAR, sulfates, boron, and fluoride. Plate 1 shows the locations of the ground water sources for which water quality information is available and identifies those producing water which does not meet the criteria for domestic and/or irrigation uses.

Domestic

Eighteen ground water sources in Surprise Valley have produced poor quality water containing constituents in excess of recommended levels for drinking water. Most of these sources had high EC levels and excessive fluoride concentrations. Six of the hot spring waters also contain excessive

sulfate and arsenic concentrations. Only water from well 44N/16E-6E1 contained chlorides exceeding the 250 mg/L maximum recommended for drinking water. This water also contained a high EC and excessive concentration of fluoride.

Irrigation

Of the 18 ground water sources not meeting drinking water standards, 14 yield water having ASAR values exceeding 9 which indicate that their use for irrigation could cause severe problems. Twenty-three ground waters had high ASAR values, indicating that their use could cause permeability or toxicity problems. Twelve of the sources having high ASAR values also contain boron concentrations exceeding 2 mg/L, which indicates that they can be damaging to most crops. EC measurements of 14 ground water sources indicate that their waters could cause salinity problems when used for irrigation.

FINDINGS

The most significant findings of this study are:

1. The surface water resources of Surprise Valley are not sufficient to last through the entire irrigation season.
2. The ground water resources of the basin must be relied upon to supplement the lack of surface supply during the irrigation season.
3. About 43,000 acre-feet of ground water were pumped in Surprise Valley for irrigation use during 1979.
4. The direction of ground water movement in this closed basin is toward the center of the valley.
5. Ground water recharge occurs primarily in the alluvial fans that form the western edge of Surprise Valley and from there ground waters move easterly toward the Alkali Lakes.
6. Channelization and straightening of some west side streams for flood control has reduced some of the ground water recharge potential in the valley.
7. Due to increased development and use of the basin's surface and ground waters, there have been declines in ground water levels since 1972.
8. Surprise Valley ground waters are generally of good mineral quality and suitable for most domestic and agricultural uses.
9. Surprise Valley ground waters in the recharge areas are usually calcium bicarbonate in character while in the central portion of the basin they are generally sodium bicarbonate in character.
10. The median electrical conductivity of the ground water sampled in Surprise Valley was 240 mhos/cm.
11. The median sulfate concentration was 6 mg/L, but eight thermal water sources contained concentration in excess of 250 mg/L.
12. The median boron concentration was 0.2 mg/L, but 12 ground water sources produced water containing concentrations exceeding 2.0 mg/L.
13. The median fluoride concentration was 0.2 mg/L, but 13 ground water sources contained concentrations exceeding 2.4 mg/L.
14. Ground waters flowing from hot springs are the poorest quality waters in Surprise Valley, containing problem levels of EC, ASAR, sulfate, boron, and fluoride.

15. Most of the thermal wells and springs in the valley are associated with the Surprise Valley and Lake City faults and produce poor quality water.
16. Data from about 200 ground water sources in Surprise Valley indicate that 18 contain mineral constituents in excess of those recommended for drinking water.
17. Fourteen ground water sources produce water that can cause severe problems when used for irrigation.

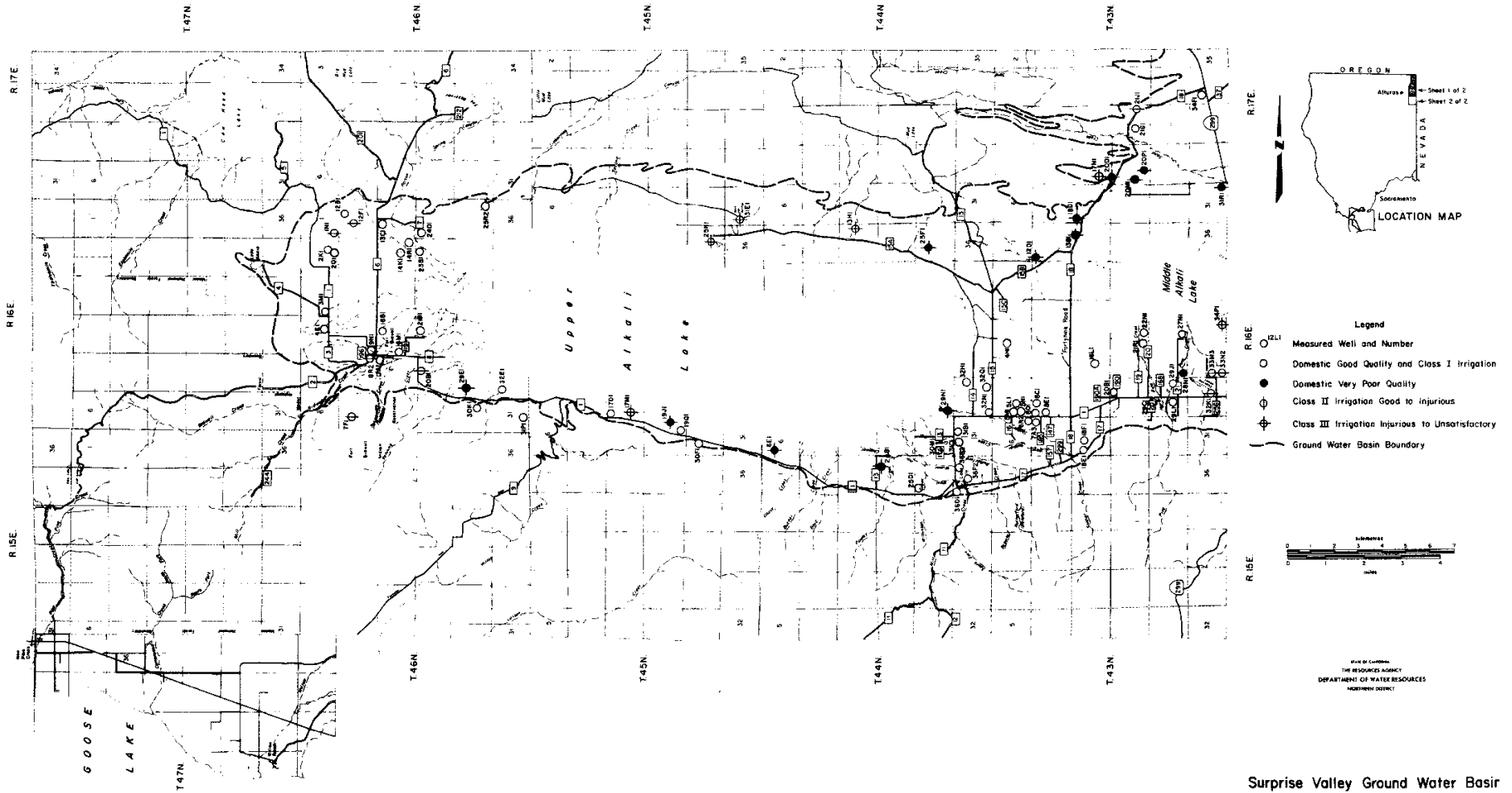
CONCLUSIONS

This investigation has resulted in the following conclusions:

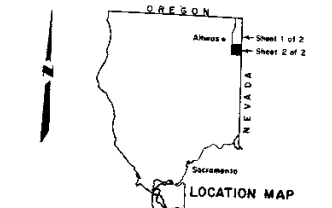
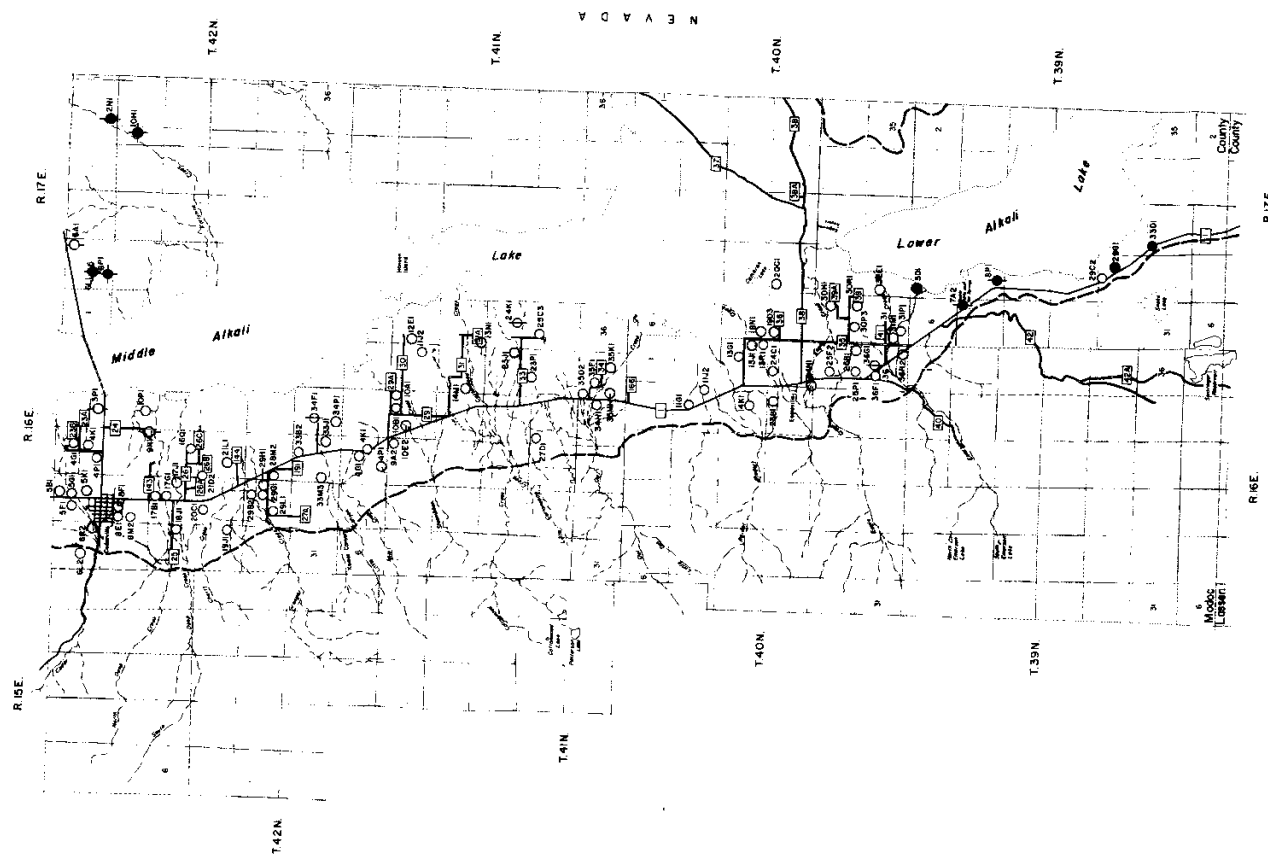
1. Any further water supply development in Surprise Valley will probably be dependent on ground water. Further development will probably cause an increase in rate of decline in ground water levels in the valley.
2. Although quality changes have occurred in a few well waters, there are no significant trends of change in the ground waters of this basin.
3. Thermal wells and springs in the valley can be expected to be poor in quality and are not recommended for domestic or irrigation use.
4. New wells which encounter thermal waters or are located in the vicinity of a major fault should have their water quality tested before they are used as a water supply.
5. Monitoring of both ground water levels and quality should be continued in this basin.
6. Recharge areas should be protected from extensive development which could interfere with recharge or result in ground water impairment.

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Surprise Valley Ground Water Basin
Water Quality Study
1986



- Legend
- (with number) Measured Well and Number
 - Domestic Good Quality and Class I Irrigation
 - Domestic Very Poor Quality
 - ⊕ Class II Irrigation Good to Injurious
 - ⊕ Class III Irrigation Injurious to Unsatisfactory
 - Ground Water Basin Boundary



STATE OF CALIFORNIA
THE RESOURCE AGENCY
DEPARTMENT OF WATER RESOURCES
NORTHERN DISTRICT

Surprise Valley Ground Water Basin
Water Quality Study
1986

APPENDIX A
WATER QUALITY CRITERIA

WATER QUALITY

Guidelines for Interpretation of Water Quality for Agriculture (UC-Committee of Consultants)

Guidelines were originally distributed to Cooperative Extension staff in December 1973. Suggestions for needed changes, additions, and corrections have been made as received. The present "guidelines" are revised to January 15, 1975 and include -

1. Guidelines for Interpretation of Quality of Water for Irrigation.
2. Assumptions and Comments on "Guidelines".
3. Crop Tolerance and Leaching Requirement Tables - Field Crops.
4. " " " " " " --Vegetable Crops.
5. " " " " " " - Fruit Crops
6. " " " " " " - Forage Crops
7. Example - Use of Crop Tolerance Tables.
8. Boron in Irrigation Waters.
9. Tolerance of Ornamental Shrubs and Ground Covers to Salinity in Irrigation Water.
10. Recommended Maximum Concentrations of Trace Elements in Irrigation Waters.
11. Guide to Use of Saline Waters for Livestock and Poultry.
12. Guidelines To Levels of Toxic Substances in Drinking Water For Livestock.
13. Tables for Calculating pH_c Values of Waters.

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Guidelines for Interpretation of Quality of Water for Irrigation

Interpretations are based on possible effects of constituents on crops and/or soils. Guidelines are flexible and should be modified when warranted by local experience or special conditions of crop, soil, and method of irrigation.

TABLE A-1

<u>PROBLEM AND RELATED CONSTITUENT</u>	<u>WATER QUALITY GUIDELINES</u>		
	<u>No Problem</u>	<u>Increasing Problems</u>	<u>Severe Problems</u>
<u>Salinity</u> ^{1/}			
EC _w of irrigation water, in millimhos/cm	<0.75	0.75-3.0	>3.0
<u>Permeability</u>			
EC of irrigation water, in mmho/cm	>0.5	<0.5	<0.2
adj.SAR ^{2/}	<6.0	6.0-9.0	>9.0
<u>Specific Ion Toxicity</u> ^{3/}			
<u>from ROOT absorption</u>			
Sodium (evaluate by adj.SAR)	<3	3.0-9.0	>9.0
Chloride (me/L)	<4	4.0-10	>10
(mg/L or ppm)	<142	142-355	>355
Boron (mg/L or ppm)	<0.5	0.5-2.0	2.0-10.0
<u>from FOLIAR absorption</u> ^{4/} (sprinklers)			
Sodium (me/L)	<3.0	>3.0	--
(mg/L or ppm)	<69	>69	--
Chloride (me/L)	<3.0	>3.0	--
(mg/L or ppm)	<106	>106	--
<u>Miscellaneous</u> ^{5/}			
NH ₄ -N } mg/L			
NO ₃ -N } or for sensitive crops	<5	5-30	>30
} ppm			
HCO ₃ (me/L) (only with overhead sprinklers)	<1.5	1.5-8.5	>8.5
(mg/L	<90	90-520	>520
or			
ppm)			
pH	normal range = 6.5-8.4 --		

- 1/ Assumes water for crop plus needed water for leaching requirement (LR) will be applied. Crops vary in tolerance to salinity. Refer to tables for crop tolerance and LR. (mmho/cmX640 = approximate total dissolved solids (TDS) in mg/L or ppm; mmhoX1000 = micromhos)
- 2/ adj.SAR (Adjusted Sodium Adsorption Ratio) is calculated from a modified equation developed by U. S. Salinity Laboratory to include added effects of precipitation or dissolution of calcium in soils and related to $\text{CO}_3 + \text{HCO}_3$ concentrations.

To evaluate sodium (permeability) hazard:

$$\frac{\text{Na}}{\sqrt{\frac{\text{Ca} + \text{Mg}}{2}}} [1 + (8.4 \text{ pHc})]$$

pHc is a calculated value based on total cations. Ca + Mg, and $\text{CO}_3 + \text{HCO}_3$. Calculating and reporting will be done by reporting laboratory.

NOTE: Na, Ca+Mg, $\text{CO}_3 + \text{HCO}_3$ should be in me/L.

Permeability problems, related to low LC or high adj.SAR of water, can be reduced if necessary by adding gypsum. Usual application rate per acre-foot of applied water is from 200 to about 1,000 lbs. (234 lbs of 100% gypsum added to 1 acre-foot of water will supply 1 me/L of calcium and raise the EC_w about 0.1 mmho.) In many cases a soil application may be needed.

- 3/ Most tree crops and woody ornamentals are sensitive to sodium and chloride (use values shown). Most annual crops are not sensitive (use salinity tolerance tables). For boron sensitivity, refer to boron tolerance tables.
- 4/ Leaf areas wet by sprinklers (rotating heads) may show a leaf burn due to sodium or chloride absorption under low humidity, high-evaporation conditions. (Evaporation increases ion concentration in water films on leaves between rotations of sprinkler heads.)
- 5/ Excess N may affect production or quality of certain crops, e.g. sugar beets, citrus, avocados, apricots, grapes, etc. (1 mg/L $\text{NO}_3\text{-N}$ = 2.72 lbs, N/acre-foot of applied water.) HCO_3 with overhead sprinkler irrigation may cause a white carbonate deposit to form on fruit and leaves.

<u>Symbol</u>	<u>Name</u>	<u>Symbol</u>	<u>Name</u>	<u>Equiv. Wt.</u>
EC_w	Electrical Conductivity of water	Na	Sodium	23.00
mmho/cm	millimho per centimeter	Ca	Calcium	20.04
<	less than	Mg	Magnesium	12.16
>	more than	CO_3	Carbonate	30.00
mg/L	milligrams per liter	HCO_3	Bicarbonate	61.00
ppm	parts per million	$\text{NO}_3\text{-N}$	Nitrate-nitrogen	14.00
LR	Leaching Requirement	Cl	Chloride	35.45
me/L	milliequivalents per liter			
TDS	Total Dissolved Solids			

17.1 ppm = 1 grain per gallon

Assumptions and Comments on Guidelines for Interpretation of Quality of Water for Irrigation Developed by University of California Committee of Consultants

1. These "guidelines" are flexible and intended for use in estimating the potential hazards to crop production associated with long-term use of the particular water being evaluated. Guidelines should be modified when warranted by local experience and special conditions of crop, soil, method of irrigation, or level of soil-water-crop management. Changes of 10 to 20 percent above or below an indicated guideline value may have little significance if considered in proper perspective along with all other variables that enter into a yield of crop.
2. It is assumed that the water will be used under average conditions--- soil texture, internal drainage, total water use, climate, and salt tolerance of crop. Large deviations from the average might make it unsafe to use water which under average conditions would be good, or might make it safe to use water, which under average conditions would be of doubtful quality.
3. The divisions into "No problem--Increasing Problem--Severe Problem" is more-or-less arbitrary, as well as carefully controlled greenhouse and small plot research conducted by various researchers over the past 40 years or more. Guidelines of one sort or another have been proposed by U. S. Geological Survey, University of California, U. S. Salinity Laboratory, and many others starting as early as 1911. As new research and observations have developed additional information for assessing water quality, guidelines have been modified.
4. These guidelines apply to surface irrigation methods such as furrow, flood, basin, sprinklers, or any other which applies water on an "as-needed" basis and which allows for an extended dry-down period between

irrigations during which the crop uses up a considerable portion of the available stored water.

5. The guidelines incorporate some of the newer concepts in soil-plant-water relationships as recently developed at U. S. Salinity Laboratory. Uptake of water occurs mostly from the upper two-thirds of the rooting depth of crops (the "more-active" part of the root zone). Each irrigation normally will leach this upper soil area and maintain it at relatively low salinity. Salts applied in the irrigation water under reasonable irrigation management concentrate in the soil water in this active root zone to about three times the concentration of the applied irrigation water and the salinity of this root area is representative of the salinity levels to which the plant responds. The salinity of the lower root zone is of less importance as long as plants are reasonably well supplied with moisture in the upper, more active, root zone.

These guidelines represent the 1974 consensus of the UC Committee of Consultants. It is recognized they are not perfect and it is expected they will be modified from time to time as further knowledge and experience dictate.

CROP TOLERANCE TABLES^{1/}

TABLE A-2. FIELD CROPS

Crop	Expected Yield Reduction ^{2/} at EC _e or EC _w indicated												Maximum ECdw ^{6/}
	0%			10%			25%			50%			
	ECe ^{3/}	ECw ^{4/}	LR ^{5/}	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	
Barley ^{7/} (Hordeum vulgare)	8.0 ^{7/}	5.3	10%	10	6.7	12%	13	8.7	15%	18	12	21%	56
Cotton (Gossypium hirsutum)	7.7	5.1	10%	9.6	6.4	12%	13	8.3	15%	17	12	21%	54
Sugarbeet (Beta vulgaris)	7.0 ^{7/}	4.7	10%	8.7	5.8	12%	11	7.5	16%	15	10	21%	48
Wheat ^{7/ 8/} (Triticum aestivum)	6.0 ^{7/}	4.0	10%	7.4	4.9	12%	9.5	6.4	16%	13	8.7	22%	40
Safflower (Carthamus tinctorius)	5.3	3.5	12%	6.2	4.1	14%	7.6	5.0	17%	9.9	6.6	23%	29
Soybean (Glycine max)	5.0	3.3	17%	5.5	3.7	18%	6.2	4.2	21%	7.5	5.0	25%	20
Sorghum (Sorghum bicolor)	4.0	2.7	7%	5.1	3.4	9%	7.2	4.8	13%	11	7.2	20%	36
Groundnut (Arachis hypogaea)	3.2	2.1	16%	3.5	2.4	18%	4.1	2.7	21%	4.9	3.3	25%	13
Rice (paddy) (Oryza sativa)	3.0	2.0	9%	3.8	2.6	11%	5.1	3.4	15%	7.2	4.8	21%	23
Sesbania (Sesbania macrocarpa)	2.3	1.5	6%	3.7	2.5	8%	5.9	3.9	12%	9.4	6.3	19%	33
Corn (grain) (Zea mays)	1.7	1.1	6%	2.5	1.7	8%	3.8	2.5	13%	5.9	3.9	20%	20
Flax (Linum usitatissimum)	1.7	1.1	6%	2.5	1.7	8%	3.8	2.5	13%	5.9	3.9	20%	20

TABLE A-2. FIELD CROPS (Continued)

Crop	Expected Yield Reduction ^{2/} at EC _e or EC _w indicated												Maximum ECdw ^{6/}
	0%			10%			25%			50%			
	ECe ^{3/}	ECw ^{4/}	LR ^{5/}	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	
Broadbean (Vicia faba)	1.6	1.1	4%	2.6	1.8	7%	4.2	2.0	12%	6.8	4.5	19%	24
Cowpea (Vigna sinensis)	1.3	0.9	5%	2.0	1.3	8%	3.1	2.1	12%	4.9	3.2	19%	17
Beans (field) (Phaseolus vulgaris)	1.0	0.7	5%	1.5	1.0	8%	2.3	1.5	12%	3.6	2.4	19%	13

TABLE A-3. VEGETABLE CROPS

Crop	Expected Yield Reduction ^{2/} at EC _e or EC _w indicated												Maximum ECdw
	0%			10%			25%			50%			
	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	
Beets ^{7/} (Beta vulgaris)	4.0	2.7	9%	5.1	3.4	11%	6.8	4.5	15%	9.6	6.4	21%	30
Broccoli (Brassica italica)	2.8	1.9	7%	3.9	2.6	10%	5.5	3.7	14%	8.2	5.5	20%	27
Tomato (Lycopersicon esculentum)	2.5	1.7	7%	3.5	2.3	9%	5.0	3.4	13%	7.6	5.0	20%	25
Cucumber (Cucumis sativus)	2.5	1.7	8%	3.3	2.2	11%	4.4	2.9	15%	6.3	4.2	21%	20
Cantaloupe (Cucumis melo)	2.2	1.5	5%	3.6	2.4	7%	5.7	3.8	12%	9.1	6.1	19%	32
Spinach (Spinacia oleracea)	2.0	1.3	4%	3.3	2.2	7%	5.3	3.5	12%	8.6	5.7	19%	30
Cabbage (Brassica oleraceacapitata)	1.8	1.2	5%	2.8	1.9	8%	4.4	2.9	12%	7.0	4.6	19%	24
Potato (Solanum tuberosum)	1.7	1.1	6%	2.5	1.7	8%	3.8	2.5	13%	5.9	3.9	20%	20
Sweet corn (Zea mays)	1.7	1.1	6%	2.5	1.7	8%	3.8	2.5	13%	5.9	3.9	20%	20
Sweet potato (Ipomoea batatas)	1.5	1.0	5%	2.4	1.6	8%	3.8	2.5	12%	6.0	4.0	19%	21
Pepper (Capsicum frutescens)	1.5	1.0	6%	2.2	1.5	9%	3.3	2.2	13%	5.1	3.4	20%	17

TABLE A-3. VEGETABLE CROPS
(Continued)

Crop	Expected Yield Reduction ^{2/} at EC _c or EC _w indicated												Maximum ECdw
	0%			10%			25%			50%			
	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	
Lettuce (<i>Lactuca sativa</i>)	1.3	0.9	5%	2.1	1.4	8%	3.2	2.1	12%	5.2	3.4	19%	18
Radish (<i>Raphanus sativas</i>)	1.2	0.8	4%	2.0	1.3	7%	3.1	2.1	12%	5.0	3.4	19%	18
Onion (<i>Allium copa</i>)	1.2	0.8	5%	1.8	1.2	8%	2.8	1.8	12%	4.3	2.9	19%	15
Carrot (<i>Daucus carota</i>)	1.0	0.7	4%	1.7	1.1	7%	2.8	1.9	12%	4.6	3.1	19%	16
Beans (<i>Phascolus vulgaris</i>)	1.0	0.7	6%	1.5	1.0	8%	2.3	1.5	12%	3.6	2.4	19%	12.5

TABLE A-4. FRUIT CROPS

Crop	Expected Yield Reduction ^{2/} at EC _e or EC _w indicated												
	0%			10%			25%			50%			Maximum
	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	ECdw
Date palm (Phoenix dactylifera)	4.0	2.7	4%	6.8	4.5	7%	10.9	7.3	11%	17.9	12	19%	64
Fig (Ficus carica)													
Olive (Olea europaea)	2.7	1.8	6%	3.8	2.6	9%	5.5	3.7	13%	8.4	5.6	20%	28
Pomegranate (Punica granatum)													
Grapefruit (Citrus paradisi)	1.8	1.2	8%	2.4	1.6	10%	3.4	2.2	14%	4.9	3.3	21%	16
Orange (Citrus sinensis)	1.7	1.1	7%	2.3	1.6	10%	3.3	2.2	14%	4.8	3.2	20%	16
Lemon (Citrus limonea)	1.7	1.1	7%	2.3	1.6	10%	3.3	2.2	14%	4.8	3.2	20%	16
Apple (Pyrus malus)													
Pear (Pyrus communis)	1.7	1.0	6%	2.3	1.6	10%	3.3	2.2	14%	4.8	3.2	20%	16
Walnut (Juglans regia)	1.7	1.1	7%	2.3	1.6	10%	3.3	2.2	14%	4.8	3.2	20%	16
Peach (Prunus persica)	1.7	1.1	9%	2.2	1.4	11%	2.9	1.9	15%	4.1	2.7	21%	13
Apricot (Prunus armeniaca)	1.6	1.1	9%	2.0	1.3	11%	2.6	1.8	15%	3.7	2.5	20%	12
Grape (Vitis spp.)	1.5	1.0	4%	2.5	1.7	7%	4.1	2.7	11%	6.7	4.5	19%	24
Almond (Prunus amygdalus)	1.5	1.0	7%	2.0	1.4	10%	2.8	1.9	13%	4.1	2.7	20%	14
Plum (Prunus domestica)	1.5	1.0	7%	2.1	1.4	10%	2.9	1.9	14%	4.3	2.8	20%	14

TABLE A-4. FRUIT CROPS
(Continued)

Crop	Expected Yield Reduction ^{2/} at EC _e or EC _w indicated												Maximum ECdw
	0%			10%			25%			50%			
	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	
Blackberry (Rubus spp.)	1.5	1.0	8%	2.0	1.3	11%	2.6	1.8	15%	3.8	2.5	21%	12
Boysenberry (Rubus spp.)	1.5	1.0	8%	2.0	1.3	11%	2.6	1.8	15%	3.8	2.5	21%	12
Avocado (Persea americana)	1.3	0.9	7%	1.8	1.2	10%	2.5	1.7	15%	3.7	2.4	20%	12
Raspberry (Rubus idaeus)	1.0	0.7	6%	1.4	1.0	9%	2.1	1.4	13%	3.2	2.1	19%	11
Strawberry (Fragaria chiloensis)	1.0	0.7	8%	1.3	0.9	10%	1.8	1.2	15%	2.5	1.7	21%	8

TABLE A-5. FORAGE CROPS

Crop	Expected Yield Reduction ^{2/} at EC _e or EC _w indicated												
	0%			10%			25%			50%			Maximum
	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	ECe	ECw	LR	ECdw
Tall wheat grass (Agropyron elongatum)	7.5	5.0	8%	9.9	6.6	10%	13.3	9.0	14%	19.4	13	21%	63
Wheat grass (fairway) (Agropyron elongatum)	7.5	5.0	11%	9.0	6.0	14%	11	7.4	17%	15	9.8	22%	44
Bermuda grass ^{9/} (Cynodon dactylon)	6.9	4.6	10%	8.5	5.7	13%	10.8	7.2	16%	14.7	9.8	22%	45
Barley (hay) ^{7/} (Hordeum vulgare)	6.0	4.0	10%	7.4	4.9	11%	9.5	6.3	16%	13.0	8.7	22%	40
Perennial rye grass (Lolium perenne)	5.6	3.7	10%	6.9	4.6	12%	8.9	5.9	16%	12.2	8.1	21%	38
Trefoil, birdsfoot ^{10/} narrow leaf (L. corniculatus tenuifolius)	5.0	3.3	11%	6.0	4.0	13%	7.5	5.0	17%	10	6.7	22%	30
Harding grass (Phalaris tuberosa)	4.6	3.1	9%	5.9	3.9	11%	7.9	5.3	15%	11.1	7.4	21%	36
Tall fescue (Festula elatior)	3.9	2.6	6%	5.8	3.9	8%	8.6	5.7	12%	13.3	8.9	19%	46
Crested Wh. grass (Agropyron desertorum)	3.5	2.3	4%	6.0	4.0	7%	9.8	6.5	11%	16	11	19%	57
Vetch (Vicia sativa)	3.0	2.0	8%	3.9	2.6	11%	5.3	3.5	15%	7.6	5.0	21%	24
Sudan grass (Sorghum sudanense)	2.8	1.9	4%	5.1	3.4	7%	8.6	5.7	11%	14.4	9.6	18%	52

TABLE A-5. FORAGE CROPS
(Continued)

Crop	Expected Yield Reduction ^{2/} at EC _e or EC _w indicated												Maximum EC _{dw}
	0%			10%			25%			50%			
	EC _e	EC _w	LR	EC _e	EC _w	LR	EC _e	EC _w	LR	EC _e	EC _w	LR	
Wildrye, beardless (Elymus triticoides)	2.7	1.8	5%	4.4	2.9	7%	6.9	4.6	12%	11.0	7.4	19%	39
Trefoil, big (Lotus uliginosis)	2.3	1.5	10%	2.8	1.9	13%	3.6	2.4	16%	4.9	3.3	22%	15
Alfalfa (Modicago sativa)	2.0	1.3	4%	3.4	2.2	7%	5.4	3.6	12%	8.8	5.9	19%	31
Lovegrass ^{9/} (Eragrostis spp.)	2.0	1.3	5%	3.2	2.1	8%	5.0	3.3	12%	8.0	5.3	19%	28
Corn (forage) (Zea mays)	1.8	1.2	4%	3.2	2.1	7%	5.2	3.5	11%	8.6	5.7	18%	31
Clover, berseem (Trifolium alexandrinum)	1.5	1.0	3%	3.2	2.2	6%	5.9	3.9	10%	10.3	6.8	18%	38
Orchard grass (Dactylis glomerata)	1.5	1.0	3%	3.1	2.1	6%	5.5	3.7	11%	9.6	6.4	18%	35
Meadow foxtail (Alopecarus pratonsis)	1.5	1.0	4%	2.5	1.7	7%	4.1	2.7	11%	6.7	4.5	19%	24
Clover, alsike, ladino, red, strawberry (Trifolium spp.)	1.5	1.0	5.5	2.3	1.6	8%	3.6	2.4	12%	5.7	3.8	19%	20

CROP TOLERANCE TABLES^{1/}

- 46
- 1/ Based on data as reported by MAAS and Hoffman (in press); Bernstein, and University of California Committee of Consultants.
 - 2/ Expected yield reduction for the particular crop due to indicated salinity of soil or salinity of irrigation water.
 - 3/ ECe means electrical conductivity of the saturation extract of the soil reported in millimhos per centimeter at 25° C. Values reported are from MAAS and Hoffman and Bernstein.
 - 4/ ECw means electrical conductivity of the irrigation water in millimhos per centimeter at 25° C. This assumes a 15 to 20 percent leaching fraction and an average salinity of soil water equal to about three times that of the irrigation water applied ($EC_{sw} = 3 EC_w$) or about twice that of the soil saturation extract ($EC_{sw} = 2 EC_e$). From the above, $EC_e = 1.5 EC_w$.
 - 5/ LR means leaching requirement and is the calculated minimum leaching fraction that can be relied upon to control salts and allow the indicated yield considering tolerance of the particular crop grown and the quality of water used. LR is determined from the equation $LR = EC_w/EC_{dw}$ 6/.
 - 6/ Maximum EC_{dw} is the maximum salinity of the percolating water draining from the root zone that can result due to removal of water by the particular crop to meet its water requirement for growth (if all the root zone soil water were at this maximum EC_{dw}, yield reduction would be 100 percent since the crop would be unable to extract water from the very salty soil water). This is the value used as EC_{dw} in the LR calculation ($LR = EC_w/EC_{dw}$). For the given crop and quality of water indicated, application of irrigation water to exactly meet the evapotranspiration demand of crop plus the LR to control salt should result in maximum efficiency of water use. At this efficiency, percolating water draining from the root zone would be minimal as to quantity but at a maximum as to salinity and should approach the maximum EC_{dw} as shown on these crop tolerance tables.
 - 7/ Barley, wheat, sugar beets, and several other crops are less tolerant of salts during germination and early seedling growth. For germination of beets, salinity of soil in the seed area should not exceed $EC_e = 3$ mmhos/cm; for barley and wheat, EC_e should not exceed $EC_e = 4$ or 5 mmhos/cm.
 - 8/ Tolerance data may not apply to semi-dwarf varieties of wheat. These are often more tolerant.
 - 9/ An average of Bermuda grass varieties. Suwanee and Coastal are about 20 percent more tolerant; common and Greenfield are about 20 percent less tolerant.
 - 10/ Average of Boer, Wilman, Sand, and Weeping Lovegrass. Lehman appears about 50 percent more tolerant.

EXAMPLE - Use of Crop Tolerance Tables

Crop = Alfalfa

Max. $EC_{dw} = 31$

$$LR\% = \frac{EC_w}{EC_{dw}} \times 100$$

$$\left(\begin{array}{l} \text{Applied water (needed} \\ \text{to supply ET+LR)} = \frac{ET}{1-LR} \end{array} \right)$$

Max. EC_w - From Tables

for 0 yield loss = 1.3 mmho, LR = 4%
10% " " = 2.2 " , LR = 7%
25% " " = 3.6 " , LR = 12%
50% " " = 5.9 " , LR = 19%

**** 0 yield loss expected with $EC_w < 1.3$

$$EC_w = 0.2 \text{ mmho, LR} = \frac{0.2}{31} \times 100 = .6\%$$

$EC_w = 0.5$ " , LR = 1.6%

$EC_w = 0.75$ " , LR = 2.4%

$EC_w = 1.00$ " , LR = 3.2%

$EC_w = 1.30$ " , LR = 4.2%

**** From 0-10% yield loss expected with $EC_w = 1.3-2.2$ mmho

$EC_w = 1.3$ mmho, LR = 4.2%

$EC_w = 1.5$ " , LR = 4.8%

$EC_w = 1.75$ " , LR = 5.6%

$EC_w = 2.0$ " , LR = 6.5%

$EC_w = 2.2$ " , LR = 7.0%

**** From 10-25% yield loss expected with $EC_w = 2.2-3.6$ mmho

$EC_w = 2.2$ mmho, LR = 7.1%

$EC_w = 2.35$ " , LR = 7.6%

$EC_w = 2.50$ " , LR = 8.1%

$EC_w = 2.75$ " , LR = 8.9%

$EC_w = 3.00$ " , LR = 9.7%

$EC_w = 3.30$ " , LR = 10.6%

$EC_w = 3.6$ " , LR = 11.6%

**** From 25-50% yield loss expected with $EC_w = 3.6-5.9$ mmho

$EC_w = 3.6$ mmho, LR = 11.6%

$EC_w = 3.80$ " , LR = 12.3%

$EC_w = 4.00$ " , LR = 12.9%

$EC_w = 4.50$ " , LR = 14.5%

$EC_w = 5.0$ " , LR = 16.1%

$EC_w = 5.3$ " , LR = 17.1%

$EC_w = 5.9$ " , LR = 19.0%

Boron in Irrigation Waters

Boron toxicity in many areas is traceable to use of irrigation waters with boron content in excess of 1 ppm. The University of California Agricultural Extension laboratories are using the following interpretation as regards boron content of irrigation water:

Below 0.5 mg/l - Satisfactory for all crops.

0.5- 1.0 mg/l - Satisfactory for most crops; sensitive crops may show injury (may show leaf injury but yields may not be affected).

1.0- 2.0 mg/l - Satisfactory for semi-tolerant crops. Sensitive crops are usually reduced in yield and vigor.

2.0-10.0 mg/l - Only tolerant crops produce satisfactory yields.

There is no economically feasible method of removing boron from irrigation water. Similarly, there is at present no chemical or soil amendment which can economically be added to the soil to render the boron non-toxic. However, growers in some areas are learning to live with marginal boron and salinity conditions by: (1) maintaining fertility levels slightly above the usual "optimum", and (2) by irrigating a little more frequently than "normal".

TABLE A-6

RELATIVE TOLERANCE OF PLANTS TO BORON

(In each group the plants first named are considered as being more sensitive and the last named more tolerant.)

<u>Sensitive</u>	<u>Semi-Tolerant</u>	<u>Tolerant</u>
0.5 mg/l	1 mg/l	2 mg/l
Lemon	Lima Bean	Carrot
Grapefruit	Sweet Potato	Lettuce
Avocado	Bell Pepper	Cabbage
Orange	Tomato	Turnip
Thornless Blackberry	Pumpkin	Onion
Apricot	Zinnia	Broad Bean
Peach	Oat	Gladiolus
Cherry	Milo	Alfalfa
Persimmon	Corn	Garden Beet
Kadota Fig	Wheat	Mangel
Grape (Sultanina & Malaga)	Barley	Sugar Beet
Apple	Olive	Palm (Phoenix Canariensis)
Pear	Ragged Robin Rose	Date Palm (Phoenix Dactylifera)
Plum	Field Pea	Asparagus
American Elm	Radish	Athel (Tamarix Aphylla)
Navy Bean	Sweet Pea	10 mg/l
Jerusalem Artichoke	Pima Cotton	
Persian (English) Walnut	Acala Cotton	
Black Walnut	Potato	
Pecan	Sunflower (Native)	
1.0 mg/l	2 mg/l	

Adopted from USDA Tech. Bull. No. 448

TABLE A-7

TOLERANCE OF ORNAMENTAL SHRUBS AND GROUND COVERS
TO SALINITY IN IRRIGATION WATER 1/

<u>Sensitive</u> ^{2/} (EC _w = .75-1.50- ^{3/})	<u>Moderately Tolerant</u> (EC _w = 1.50-3.0)	<u>Tolerant</u> (more than EC _w = 3.0)
Star jasmine (Trachelospermum jasminoides)	Pittosporum (P. tobira)	Oleander (Nerium oleander)
Pineapple guava (Feijoa sellowiana)	Viburnum (V. tinus v. robustum)	Pyracantha (P. graeberi)
Burford holly (Ilex cornuta Burford)	Texas privet (Ligustrum lucidum)	Rosemary (Rosmarinus lockwoodi)
Rose (Rosa sp. var. Grenoble on Dr. Huey root)	Lantana (L. camara)	Dracaena (D. endivisa)
Algerian ivy (Hedera canariensis)	Boxwood (Buxus microphylla v. japonica)	Euonymus (E. japonica v. grandiflora)
Hibiscus (H. rosa-sinensis cv. Brillante)	Xylosma (X senticosa)	Natal plum (Carissa grandiflora)
Heavenly bamboo (Nandina domestica)	Arborvitae (Thuja orientalis)	Bougainvillea (B. spectabilis)
	Dodonea (D. viscosa v. atropurpurea)	
	Silverberry (Elaeagnus pungens)	
	Spreading juniper (Juniperus chinensis)	
	Bottlebrush (Callistemon viminalis)	

1/ Source: L. Bernstein, L. E. Francois, and R. A. Clark. 1972. "Salt Tolerance of Ornamental Shrubs and Ground Covers. J. Amer. Soc. Hort. Sci. 97(4):550-556.

2/ Listed in decreasing order of sensitivity. EC_w values shown are associated with generally satisfactory appearance and up ^w to 25% decrease in top growth.

3/ EC_w means electrical conductivity of irrigation water (in mmho/cm). Assumptions include the following: EC_e X 2 = EC_{sw}; EC_e = electrical conductivity of soil saturation extract, representative of the more active part of the root zone; EC_{sw} = electrical conductivity of soil water; EC_w X 3 = EC_{sw}, 1/2 EC_{sw} = EC_e, ^{sw}EC_e = 3/2 EC_w

TABLE A-8

RECOMMENDED MAXIMUM CONCENTRATIONS OF
TRACE ELEMENTS IN IRRIGATION WATERS 1/

<u>Element</u>	For Waters Used Continuously on All Soil	For Use Up to 20 Years on Fine Textured Soils of pH 6.0 to 8.5
	<u>mg/l</u>	<u>mg/l</u>
Aluminum	5.0	20.0
Arsenic	0.10	2.0
Beryllium	0.10	0.50
Boron	0.75	2.0
Cadmium	0.010	0.050
Chromium	.10	1.0
Cobalt	.050	5.0
Copper	0.20	5.0
Fluoride	1.0	15.0
Iron	5.0	20.0
Lead	5.0	10.0
Lithium	2.5 ^{2/}	2.5 ^{2/}
Manganese	0.20	10.0
Molybdenum	0.010	0.050 ^{3/}
Nickel	0.20	2.0
Selenium	0.020	0.020
Vanadium	0.10	1.0
Zinc	2.0	10.0

1/ These levels will normally not adversely affect plants or soils.
No data available for mercury, silver, tin, titanium, tungsten.

2/ Recommended maximum concentration for irrigating citrus is 0.075 mg/l.

3/ For only acid fine-textured soils or acid soils with relatively high iron oxide contents.

Source: Above data based on Environmental Studies Board, Nat. Acad. of Sci., Nat. Acad. of Eng. "Water Quality Criteria 1972" (U. S. Gov't. Print. Off., Washington, D. C. 20402), p. 339.

TABLE A-9

GUIDE TO THE USE OF SALINE WATERS
FOR LIVESTOCK AND POULTRY 1/

Total Soluble Salt
Content of Waters (mg/l)

Less than 1,000 mg/l (EC less than 1.5) <u>2/</u>	Relatively low level of salinity. Excellent for all classes of livestock and poultry.
1,000-2,999 (EC = 1.5-5)	Very satisfactory for all classes of livestock and poultry. May cause temporary and mild diarrhea in livestock not accustomed to them or watery droppings in poultry.
3,000-4,999 (EC = 5-8)	Satisfactory for livestock, but may cause temporary diarrhea or be refused at first by animals not accustomed to them. Poor waters for poultry, often causing water feces, increased mortality and decreased growth, especially in turkeys.
5,000-6,999 (EC = 8-11)	Can be used with reasonable safety for dairy and beef cattle, for sheep, swine, and horses. Avoid use for pregnant or lactating animals. Not acceptable for poultry.
7,000-10,000 (EC = 11-16)	Unfit for poultry and probably for swine. Considerable risk in using for pregnant or lactating cows, horses, or sheep, or for the young of these species. In general, use should be avoided although older ruminants, horses, poultry, and swine may subsist on them under certain conditions.
Over 10,000 (EC over 16)	Risks with these highly saline waters are so great that they cannot be recommended for use under any conditions.

1/ Environmental Studies Board, Nat. Acad. of Sci, Nat. Acad. of Eng.
 "Water Quality Criteria 1972" (U. S. Gov't. Print. Off., Washington,
 D. C. 20402), p. 308.

2/ EC values shown are reported as mmho/cm and are only approximations
 based on rough conversion of given mg/l to EC by $\text{mg/l} \div 640 = \text{EC}$.

TABLE A-10

GUIDELINES TO LEVELS OF TOXIC
SUBSTANCES IN DRINKING WATER FOR LIVESTOCK ^{1/}

<u>Constituent</u>	<u>Upper Limit</u>
Aluminum (Al)	5 mg/l
Arsenic (As)	0.2 mg/l
Beryllium (Be)	No data
Boron (B)	5.0 mg/l
Cadmium (Cd)	.05 mg/l
Chromium (Cr)	1.0 mg/l
Cobalt (Co)	1.0 mg/l
Copper (Cu)	0.5 mg/l
Fluoride (F)	2.0 mg/l
Iron (Fe)	No data
Lead (Pb)	0.1 mg/l ^{2/}
Manganese (Mn)	No data
Mercury (Hg)	.01 mg/l
Molybdenum (Mo)	0.5 mg/l
Nitrate + Nitrite (NO ₃ -N+NO ₂ -N)	100 mg/l
Nitrite (NO ₂ -N)	10 mg/l
Selenium (Se)	0.05 mg/l
Vanadium (Va)	0.10 mg/l
Zinc (Zn)	25 mg/l
Total Dissolved (TDS) Solids	10,000 mg/l ^{3/}

^{1/} Based primarily on Environmental Studies Board, Nat. Acad. of Sci., Nat. Acad. of Eng., "Water Quality Criteria 1972" (U. S. Gov't. Print. Off., Washington, D. C. 20402), p. 309-317.

^{2/} Lead is accumulative and problems may begin at threshold value = 0.05 mg/l.

^{3/} See "Guide to Use of Saline Waters for Livestock and Poultry", included as separate "Guide".

APPENDIX B

WELL DATA

APPENDIX B. WELL DATA

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
38N/17E/3N1	Bare Ranch Cattle Company	120	-	no	stock	cased 100'
38N/17E/10D1	Christenson Bros.	120	1910	no	stock	3" casing to 100'
38N/17E/10N1	Christenson Bros.	-	-	no	stock	spring
38N/17E-10P1	Bare Ranch	-	-	no	dom	3' by 3' hand dug
38N/17E/14B1	Unknown	97	-	no	-	artesian
39N/17E/5D1	D. L. Grove	175	1935	no	stock/irr	4" casing
39N/17E/7A1	Menlo Resort	-	-	no	dom	hot spring
39N/17E/7A2	Menlo Resort	-	-	no	irr	hot spring
39N/17E/7A3	Menlo Resort	-	-	no	irr	hot spring
39N/17E/8P1	Homer Pine	-	-	no	stock	cold spring
39N/17E/29C1	W. T. Cottrell	23	-	no	dom	spring
39N/17E/29C2	W. T. Cottrell	-	-	no	dom	spring
39N/17E/29G1	W. T. Cottrell	-	-	no	irr	hot spring
39N/17E/33D1	Christenson	-	-	no	no use	hot spring
39N/17E-33D4	Christenson	-	-	no	no use	hot spring
40N/16E-11C1	Bob Cockrell	280	1977	no	irr	
40N/16E/11G1	Lewis Cockrell	350	1910	no	dom	4" cased depth
40N/16E/11J2	Bob Cockrell	440	1974	yes	irr	14" cased depth
40N/16E/13G1	A. W. Dollarhide	290	1946	yes	irr	16" casing
40N/16E/13J1	Jack Powers	160	1948	no	irr	12" cased depth
40N/16E/13M1	White Pine Ranch	450	1968	yes	irr	14" cased depth

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
40N/16E/13R1	Grace Lucky U Ranch	160	1948	no	irr	12" cased depth
40N/16E/13R2	Howard J. Power	160	-	no	-	artesian
40N/16E/14K1	Dollarhide	450	1976	yes	irr	cased to 400'
40N/16E/23B1	White Pine Ranch	724	1966	yes	irr	14" cased depth
40N/16E/24C1	White Pine Ranch	430	1979	no	irr	
40N/16E/24N1	Earnest & Jack Grove	45	1910	no	dom	cased to 30'
40N/16E/25F2	Harris Bros.	240	-	no	irr	
40N/16E/25P1	Harris Bros.	456	1961	yes	irr	cased depth
40N/16E/25R1	W. C. Warren	45	-	no	dom	cased to 30'
40N/16E/25R2	W. C. Warren	453	1974	yes	irr	cased depth
40N/16E/36F1	D. I. Grove	105	-	no	dom	6" casing
40N/16E/36G1	Joe & Juanita Bicondoa	145	1948	yes	irr	cased depth
40N/16E/36G2	Joe & Juanita Bicondoa	400	-	no	irr	cased depth
40N/16E/36R2	Joe & Juanita Bicondoa	-	-	no	irr	14" casing
40N/17E/18N1	Ben Cambron	390	-	no	irr	artesian
40N/17E/19D3	Ben Cambron	172	1954	no	dom	artesian
40N/17E/20C1	M. Stevenson	160	1955	no	stock	artesian
40N/17E/30H1	Etta Langston	165	-	no	dom	artesian
40N/17E/30P3	Marcel Miura	280	1977	yes	irr	cased depth
40N/17E/30R1	Dollarhide	350	1956	no	irr	
40N/17E/31M1	D. L. Grove	250	1948	no	irr	14" casing

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
40N/17E/31P1	Dave Tidwell	240	-	no	irr	14" casing
40N/17E/32E1	D. L. Grove	152	1935	no	irr	4" casing
41N/16E/4G1	Lee Heryford	190	1933	no	stock	4" casing
41N/16E/4K1	Lee Heryford	486	1968	yes	irr	14" cased depth
41N/16E/4P1	Lee Heryford	275	1977	no	irr	14" casing
41N/16E/9A2	Mel Hansen	500	1968	yes	irr	14" cased depth
41N/16E/10A1	Dale Goodwin	265	1975	yes	irr	8" cased depth
41N/16E/10B1	Dale Goodwin	320	1979	yes	irr	cased depth
41N/16E/10E2	Unknown	-	-	no	stock	artesian
41N/16E/11J2	Alex Erquiaga	362	1979	yes	irr	cased depth
41N/16E/12E1	Unknown	-	-	no	stock	artesian
41N/16E/13N1	Don Coop	230	1935	no	stock	2" casing, artesian
41N/16E/23J1	Unknown	-	-	no	irr	
41N/16E/23P1	George Laxague	60	1956	no	dom	6" casing
41N/16E/24K1	Bob Cockrell	150	-	no	stock	artesian
41N/16E/25C3	Harold Malitz	130	-	no	dom	3" casing
41N/16E/27D1	Dudley Kilpatnek	500	1976	yes	irr	14" cased depth
41N/16E/34H1	C. N. Snell	78	1947	no	-	6" cased to 70'
41N/16E/35D1	Ed Berryessa	65	-	no	-	6" casing

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
41N/16E/35D2	Ed Berryessa	156	1959	yes	irr	14" cased depth
41N/16E/35F1	Ed Berryessa	60	-	no	dom	6" casing
41N/16E/35K1	L. Berryessa	105	-	no	dom/stock	3" casing
41N/16E/35M1	Berryessa	390	1965	no	irr	14" casing
42N/16E/3P1	Unknown	-	-	no	stock	artesian
42N/16E/4G1	B. G. Bunyard	300	1978	yes	irr	cased depth
42N/16E/4K1	D. L. Ferguson	525	1973	yes	irr	12" cased depth
42N/16E/4N5	Y. M. Etchebarne	280	1977	yes	irr	12" cased depth
42N/16E/4P1	Michel Urrels	120	1956	no	irr	
42N/16E/5B1	R. P. Lundahl	280	1950	no	irr	12" cased depth
42N/16E/5F1	Allen	440	-	no	irr	
42N/16E/5G1	Leale Harris	286	1967	yes	irr	12" cased depth
42N/16E/5K1	Warrens Ranch	390	1976	yes	irr	12" cased depth
42N/16E/6L2	Surprise Valley Lumber	84	1947	no	ind	6" cased depth
42N/16E/6R1	Surprise Valley Lumber	84	1947	no	ind	6" casing
42N/16E/6R2	Surprise Valley Lumber	84	1947	no	dom/ind	6" casing
42N/16E/8E1	Modoc County Fair	390	1950	yes	dom/irr	10" cased depth
42N/16E/8F1	Modoc County Fair	65	-	no	dom	cased from 7' to 65'
42N/16E/8M1	W. O. Hussa	-	-	no	dom	
42N/16E/8M2	W. O. Hussa	211	1960	yes	irr	14" cased to 197'

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
42N/16E/9R1	R. P. Lundahl	150	1900	no	dom/stock	3" casing, artesian
42N/16E/10P1	R. P. Lundahl	90	1935	no	stock	6" casing
42N/16E/10P2	W. O. Hussa	410	1928	no	ind	4" casing, artesian
42N/16E/16Q1	John P. Robinson	200	1980	no	irr	8" casing
42N/16E/17B1	Don Rosendahl	320	1975	no	irr	12" casing
42N/16E/17G1	Don Rosendahl	640	1966	no	irr	
42N/16E/17J1	R. P. Lundahl	410	1928	no	ind	4" casing, artesian
42N/16E/18J1	Margret Hauser	294	1967	yes	irr	14" cased depth
42N/16E/19J1	John Laxague	380	1977	no	irr	
42N/16E/20C1	W. H. Dollarhide	320	1967	yes	irr	10" casing
42N/16E/21D1	E. Benner	440	1980	no	irr	12" casing
42N/16E/21L1	J. B. Laxague	160	-	no	dom/stock	4" casing, artesian
42N/16E/28M1	Jack Benner	150	-	no	dom/stock	4" casing, artesian
42N/16E/28M2	Jack Benner	420	1968	yes	irr	14" cased depth
42N/16E/29B2	John Laxague	475	1968	yes	irr	14" cased depth
42N/16E/29G1	Ira Paske	153	1957	yes	irr	12" casing
42N/16E/29G2	Sidney Smith	425	1979	no	irr	
42N/16E/29H1	R. P. Lundahl	70	1949	no	dom	8" cased depth
42N/16E/29L1	Jack Benner	400	1979	yes	irr	12" cased depth

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
42N/16E/33B2	Hicks Bros.	295	1977	yes	irr	12" cased depth
42N/16E/33J1	Lee Henryford, Sr.	65	1915	no	dom	4" casing
42N/16E/33M3	R. P. Lundahl	60	-	no	dom/stock	3" casing
42N/16E/34F1	Elmer Cook	360	-	no	dom	artesian
42N/16E/34P1	R. P. Lundahl	60	-	no	stock	artesian
42N/17E/2N1	Unknown	-	-	no	dom	
42N/17E/6A1	Ralph D. Stanton	110	1950	no	irr	12" cased depth
42N/17E/6L1	M. V. Hilling	-	-	no	dom	hot spring
42N/17E/6P1	Cederville Hot Springs	-	-	no	baths	hot spring
42N/17E/10H1	Bureau of Land Management	50	1954	no	stock	6" casing
43N/16E/4H1	R. P. Lundahl	52	-	no	stock	4" casing
43N/16E/5L1	Bud Schreiber	402	1969	yes	irr	14" cased depth
43N/16E/5M1	Charles H. Anderson	236	1930	no	irr	12" casing
43N/16E/5N1	Charles H. Anderson	236	1930	no	irr	12" casing
43N/16E/6R1	Dave Baty	60	1910	no	dom	3" casing
43N/16E/8D1	Lewis L. Beck	140	1966	yes	stock	6" cased depth
43N/16E/8E1	Fred Ellena	186	1981	yes	irr	12" cased depth
43N/16E/8G1	James Harris	384	1975	yes	irr	12" cased depth
43N/16E/12D1	M. V. Hilling	-	-	no	irr	hot springs
43N/16E/13B1	Old Leonard Baths	-	-	no	baths	hot springs

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
43N/16E/16L1	G. W. Warren	60	1910	no	stock	3" casing
43N/16E/18E1	Joe McFarlen	240	1979	no	dom	6" cased depth
43N/16E/18F1	G. W. Warren	285	-	yes	irr	cased depth
43N/16E/20B1	G. W. Warren	100	1946	no	dom	6" casing
43N/16E/21R1	LeRoy Davis	180	1910	no	-	4" casing
43N/16E/22N1	LeRoy Davis	100	1910	no	-	4" casing, artesian
43N/16E/27N1	Clyde A. Hill	100	1908	no	-	4" casing
43N/16E/27N2	Clyde A. Hill	145	1928	no	-	3" casing, artesian
43N/16E/28N1	Circle Cross Ranch	160	1910	no	dom	14" casing
43N/16E/29C1	J. Robinson	-	-	no	irr	14" casing
43N/16E/29J1	Clyde Hill	520	1965	no	irr	14" casing
43N/16E/29L1	Don Coops	342	1969	yes	irr	14" cased depth
43N/16E/32K1	Modoc County Airport	290	1967	yes	irr	8" cased depth
43N/16E/33K2	Gordon Ash	263	1967	yes	irr	14" cased depth
43N/16E/33M3	Frank Arreche	60	-	no	dom/stock	3" casing
43N/16E/33N2	Gordon Ash	264	1967	yes	irr	12" cased depth
43N/16E/34P1	Y. L. Beebe	60	-	no	stock	artesian
43N/17E/17N1	Unknown	-	-	no	-	
43N/17E/18D1	Old Leonard Baths	-	-	no	baths	hot springs
43N/17E/20D1	Unknown	-	-	no	stock	windmill
43N/17E/20M1	G. Sterling	274	1970	no	irr	

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
43N/17E/20P1	Arnold White	-	-	no	irr	
43N/17E/21J1	Bureau of Land Management	108	-	no	stock	windmill
43N/17E/21L1	Dave Allen	270	1970	no	irr	
43N/17E/31R1	James K. Rose	185	1977	no	none	8" casing, artesian
43N/17E/34F1	Bureau of Land Management	195	1952	yes	stock	windmill
44N/15E/24B1	M. V. Hilling	-	-	no	-	hot springs
44N/15E/25D1	R. P. Lundahl	69	1954	no	dom/stock	6" casing
44N/15E/36B2	George Jacobs	65	1945	no	-	4" casing, artesian
44N/15E/36D1	Lake City Cemetery	209	1969	yes	irr	8" cased depth
44N/15E/36F2	Lake City Church	90	1968	yes	dom	6" cased to 86'
44N/16E/6E1	M. Quirk	600	-	no	irr	6" casing, artesian
44N/16E/6E2	M. Quirk	450	1947	no	irr	6" casing, artesian
44N/16E/13H1	Bureau of Land Management	-	-	no	stock	windmill
44N/16E/25F1	Bureau of Land Management	-	-	no	stock	windmill
44N/16E/29N1	B. Patch	1100	1951	no	irr	16" cased to 900'
44N/16E/30M1	Glenn Coughran	35	1956	no	stock	12" casing
44N/16E/31B1	N. Heard	49	1951	yes	dom/irr	12" cased depth
44N/16E/31C1	B. Steward	70	-	no	dom	
44N/16E/32H1	R. P. Lundahl	117	1952	no	dom/irr	6" casing

APPENDIX B. WELL DATA (Continued)

Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
44N/16E/32N1	Arnold White	340	1980	no	irr	12" casing
44N/16E/32Q1	Joe Butham	360	1976	yes	irr	Owner has copy of well log
45N/16E/17D1	Lloyd Hanks	45	1956	no	dom	
45N/16E/17M1	George Hanks	79	1937	no	stock	3" casing, artesian
45N/16E/19J1	Lyle Hill	118	-	no	stock	3" casing, artesian
45N/16E/19Q1	Lyle Hill	183	1947	no	dom/irr	artesian
45N/16E/25K1	Unknown	-	-	no	irr	artesian
45N/16E/30F1	John Martinex	80	-	no	-	
45N/17/31E1	Boyd Hot Springs	-	-	no	-	hot springs
46N/16E/1N1	Frank Moser	260	1971	yes	irr	12" cased depth
46N/16E/2Q1	Frank Moser	410	1979	yes	irr	12" cased depth
46N/16E/3B1	Cary Ranch	370	1967	yes	irr	14" cased depth
46N/16E/3M1	Cary Ranch	400	1979	yes	irr	cased depth
46N/16E/4K1	C. A. Youngman	23	-	no	dom	10" casing
46N/16E/7F1	G. T. Patterson	-	-	no	-	artesian
46N/16E/8R2	Walter T. Baker	197	1971	yes	dom/irr	8" cased to 177'
46N/16E/8R3	Walter T. Baker	60	1966	yes	dom	6" cased depth
46N/16E/9N1	M. E. Conlan	108	-	no	dom	6" casing
46N/16E/12F1	Phillip Peterson	300	1972	yes	irr	14" cased depth

APPENDIX B. WELL DATA (Continued)

	Well No.	Owner	Depth (ft.)	Year Drilled	Log	Well Use	Construction Data and Remarks
	46N/16E/13C1	R. W. Peterson	179	-	no	dom	4" casing
	46N/16E/14K1	R. P. Lundahl	112	-	no	stock	6" casing, artesian
	46N/16E/14R1	Fee Ranch Inc.	200	-	no	irr/stock	4" casing, artesian
	46N/16E/15B1	J. P. McAuliffe	59	-	no	stock	3" casing, artesian
	46N/16E/16B1	Jack Cowlin	378	1981	no	irr	14" casing
	46N/16E/16M1	Esmond Lague	74	1968	yes	dom	8" cased depth
	46N/16E/17A1	Robert Sculute	115	-	no	dom	
	46N/16E/20B1	Bob Cole	396	1970	yes	irr	14" cased depth
	46N/16E/21B1	Fee Ranch Inc.	95	1926	no	irr	5" casing, artesian
99	46N/16E/21B6	S. O. Calligan	79	-	no	irr	14" casing, artesian
	46N/16E/23B1	Larance Fee	200	1915	no	irr/stock	4" casing, artesian
	46N/16E/24D1	Max Fulcher	457	1949	no	none	14" casing, artesian
	46N/16E/25R2	Jack Stooksberry	102	1954	no	stock	8" casing, artesian
	46N/16E/29E1	Harold Talbots	217	1955	no	irr	artesian
	46N/16E/30K1	Lester V. Grade	400	1978	no	irr	12" casing
	46N/16E/31R1	Max Fulcher	41	1927	no	-	4" casing, artesian
	46N/16E/32E1	Lester V. Grade	400	1978	no	irr	12" casing

APPENDIX C
MINERAL ANALYSIS OF GROUND WATER

MINERAL ANALYSES OF GROUND WATER

Abbreviations

- TIME - Pacific Standard Time on a 24-hour clock
- TEMP - Water temperature at time of sampling in degrees Farenheit (F) and Celsius (C)
- PH - Measure of acidity (<7) or alkalinity (>7) of water
- EC - Electrical conductance in micromhos at 25° Celsius
- TDS - Gravimetric determination of total dissolved solids at 180° Celsius
- SUM - Total dissolved solids by summation of analyzed constituents
- TH - Total hardness
- NCH - Noncarbonate hardness - any excess of total hardness over total alkalinity
- ASAR - Adjusted sodium adsorption ratio

PERCENT REACTANCE VALUE is determined by dividing the sum of the cations or anions in milliequivalents per liter into each constituent in milliequivalents per liter, arriving at a percentage. For a partial analysis, an approximate value is determined by multiplying the electrical conductance by 0.01 and using that as the cation or anion sum.

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM
				CA	MG	NA	K	CACO3	SO4	CL	NO3	B TURB	F SIO2						

	G G-12 G-12.A		NORTH LAHONTAN HB SURPRISE VALLEY HU RARE CREEK HA																
	39N/17E-29C01 M																		
10/20/82	5050	76.0F	7.8 232	9.0	1.0	38	3.0	87	--	6.0	--	--	--		26	3.2			
1210	5050	24.4C	7.7 228	.45	.08	1.45	.08	1.74		.17					0	2.9		S	
				20	4	73	4												
	39N/17E-29C02 M																		
06/13/58	5050	76.0F		10	1.2	34	3.0	88	12	55	2.3	.22	.6		30	2.7			
1336	9551	24.4C	8.4 170	.50	.10	1.48	.08	1.76	.25	1.55	.04		49.0	210	0	2.6		C	
				23	5	69	4	49	7	43	1							S	
10/20/82	5050	102.0F	9.2 288	2.0	.0	58	1.2	62	--	.15	--	.4	1.7		5	11.3			
1230	5050	38.9C	8.2 290	.10	.00	2.52	.03	1.24		.42			--		0	0.2		S	
				4	0	95	1												
72	39N/17E-29G M																		
06/13/58	5050	76 F	8.4 170	10	1.2	34	3.0	88	12	5.5	2.3	.22	.6	170	30	2.7			
1221	5050	24 C		.50	.10	1.48	.08	1.76	.25	.16	.04		49.0	170	0	2.6			
				23	5	69	4	80	11	7	2								
	39N/17E-29G01 M																		
06/13/58	5050	106.0F		2.6	.2	59	1.7	70	39	16	.8	.4	2.0		7	9.7			
1315	5000	41.1C	8.5 286	.13	.02	2.57	.04	1.40	.81	.45	.01		42.0	204	0	2.1			
				5	1	93	1	52	30	17	0								
	39N/17E-33D01 M																		
10/20/82	5050	107.0F	9.4 327	2.0	.0	64	1.1	52	--	.19	--	.4	2.3		5	12.5			
1300	5050	41.6C	9.0 317	.10	.00	2.78	.03	1.04		.54			--		0	0.7		S	
				3	0	96	1												
	39N/17E-33D04 M																		
09/11/58	5050	109.0F		2.4	.2	62	1.6	59	57	21	.9	.6	.2		7	10.2			
1530	5000	42.7C	9.0 319	.12	.02	2.70	.04	1.18	1.19	.59	.01		39.0	219	0	1.4			
				4	1	94	1	40	40	20	0								
	40N/16E-24N01 M																		
07/ /56	5050			21	7.2	8.8	2.9	10.2	3.3	1.0	1.1	.00	.0		82	0.4			
	5000		7.9 189	1.05	.59	.38	.07	2.04	.07	.03	.02		36.0	142	0	0.6			
				50	28	18	3	94	3	1	1								

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM

G G-12 G-12.A		NORTH LAHONTIAN HB SURPRISE VALLEY HU RARE CREEK HA																	

40N/16E-25F02 M																			
08/25/82	5050	69.0F	7.9	180	18	4.0	13	4.2	91	--	1.0	--	--	--		62	0.7		
0930	5050	20.5C	7.8	180	.90	.33	.57	.11	1.62		.03	--	--	--		0	0.9		S
					47	17	30	6											
08/23/83	5050	67.5F	7.8	180	--	--	--	--	--	--	--	--	--	--					
0845	0000	19.7C																	

40N/16E-25P01 M																			
08/25/82	5050	74.0F	7.4	215	16	4.0	23	5.6	100	--	3.0	--	--	--		56	1.3		
0820	5050	23.3C	7.8	218	.80	.33	1.00	.14	2.00		.08	--	--	--		0	1.7		S
					35	15	44	6											
08/23/83	5050	74.0F	7.5	217	--	--	--	--	--	--	--	--	--	--					
0855	0000	23.3C																	

40N/16E-25R01 M																			
06/13/58	5050	56.0F			22	8.6	13	2.4	117	2.1	3.5	2.0	.02	.3		90	0.6		
1455	9551	13.3C	8.3	180	1.10	.71	.57	.06	2.34	.04	.10	.03		40.0	144	0	0.9		C
					45	29	23	2	93	2	4	1							

40N/16E-25R02 M																			
09/02/82	5050	70.0F	7.5	320	--	--	--	--	--	--	--	--	--	--					
0930	0000	21.1C																	

40N/16E-36F01 M																			
06/13/58	5050	56.0F			36	15	21	2.6	185	9.1	5.0	3.0	.06	.6		150	0.7		
1415	9551	13.3C	8.5	280	1.80	1.23	.91	.07	3.70	.19	.14	.05		44.0	247	0	1.5		C
					45	31	23	2	91	5	3	1							
08/26/59	5050				44	19	25	3.5	213	11	10	1.1	.00	.1	292	188	0.8		E
	5050	8.1	411	2.20	1.56	1.09	.09	.02	4.26	.23	.28	.02		50.0	291	0	1.7		
					45	32	22	2	89	5	6	0							
07/28/60	5050				41	17	24	2.9	206	9.0	2.5	2.0	.08	.1	268	171	0.8		
	5050	8.3	397	2.05	1.40	1.04	.07	.02	4.12	.19	.07	.03		47.0	269	0	1.6		
					45	31	23	2	93	4	2	1							
08/22/61	5050	66.0F			32	14	23	2.6	172	8.1	2.8	1.3	.07	.2	229	137	0.9		
	5050	18.9C	8.5	336	1.60	1.15	1.00	.07	3.44	.17	.08	.02		46.0	233	0	1.6		
					42	30	26	2	93	5	2	1							

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER							REM

				CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH	SAR ASAR			

		G	NORTH LAHONTAN HB																
		G-12	SURPRISE VALLEY HU																
		G-12.A	BARE CREEK HA																
		40N/16E-36F01 M																	
		CONTINUED																	
08/14/75	5050	57.0F	7.1	400	--	--	--	181	--	3.5	6.2	--	--			145			
0815	5050	13.9C	8.3	368				3.62		.10	.10		--					S	
08/26/76	5050	63.0F	7.2	250	--	--	--	126	--	1.3	--	--	--			105			
0745	5050	17.2C	8.5	241				2.52		.04			--					S	
06/30/77	5050	57.0F	7.9	310	28	13	15	2.8	148	6.0	2.0	1.1	.0	--	133	124	0.6		
1545	5050	13.9C	8.3	303	1.40 44	1.07 34	.65 20	.07 2	2.96 94	.12 4	.06 2	.02 1	--	157	0	1.0			
08/24/78	5050	64.0F	7.4	280	--	--	--	--	--	--	--	--	--						
0850	0000	17.8C											--					S	
07/12/79	5050	67.0F	7.9	290	--	--	--	--	--	--	--	--	--						
0945	0000	19.4C											--					S	
08/15/80	5050	59.0F	7.7	300	--	--	--	--	--	--	--	--	--						
0930	0000	15.0C											--					S	
08/13/81	5050	67.0F	8.2	235	--	--	--	--	--	--	--	--	--						
0830	0000	19.4C											--					S	
08/19/82	5050	66.0F	8.0	245	21	10	9.0	3.4	110	--	1.0	--	.0	--		94	0.4		
0840	5050	18.9C	8.4	221	1.05 45	.82 35	.39 17	.09 4	2.20		.03		--		0	0.6		S	
		40N/16E-36G01 M																	
08/07/83	5050	56.0F			49	11	15	2.1	153	1.4	.0	1.3	.0	.1	193	117	0.6	E	
	5050	13.3C	8.0	270	2.45 60	.90 22	.65 16	.05 1	3.06 98	.03 1	.00 0	.02 1	39.0	211	15	1.1		C	
																		S	
07/15/84	5050	59.0F			26	13	14	2.3	140	4.0	1.0	2.6	.0	--	179	119	0.6		
	5050	14.4C	7.9	286	1.30 43	1.07 35	.61 20	.06 2	2.80 95	.08 3	.03 1	.04 1	--	147	0	1.0			
08/01/88	5050	55 F	7.3	275	.27	12	12	2.5	128	4.0	1.8	5.0	.0	--	192	117	0.5	E	
1015	5050	13 C	8.5	269	1.35 46	.99 34	.52 18	.06 2	2.56 92	.08 3	.05 2	.08 3	--	141	0	0.8		T	

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAR	REM	

				CA	MG	NA	K	CACD3	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH	ASAR		

G G-12 G-12.A		NORTH LAHONTAN HB SURPRISE VALLEY HU BARE CREEK HA																
4CN/16F-36G01 M																		
07/16/69	5050	57.0F	7.3	280	--	--	13	--	135	CONTINUED				--	.1		112	
1015	5050	13.9C	7.9	263			.57	--	2.70	--	2.2	--	--	.1				
							20				.06	--	--	--			S	
09/15/71	5050	54 F	7.2	302	--	--	--	--	151	--	.0	--	--	--		135		
0800	5050	12 C	8.0	306					3.02	--	.00	--	--	--			S	
08/01/73	5050	54.0F	7.2	340	32	14	14	2.6	157	5.4	1.4	6.7	.0	--	189	136	0.5	
1330	5050	12.2C	8.5	306	1.60	1.15	.61	.07	3.14	.11	.04	.11	--	--	170	0	1.0	
					47	34	18	2	92	3	1	3						
07/17/74	5050	56.0F	7.3	320	--	--	--	--	--	--	--	--	--	--				
1635	0000	13.3C															S	
08/14/75	5050	55.0F	7.2	325	--	--	--	--	--	--	--	--	--	--				
0830	0000	12.8C															S	
06/30/77	5050	55.0F	7.3	305	30	12	12	1.5	142	4.0	1.0	3.8	.0	--	165	125	0.5	
1550	5050	12.8C	8.3	294	1.50	.99	.52	.04	2.84	.08	.03	.06	--	--	149	0	0.8	
					49	32	17	1	94	3	1	2						
08/24/78	5050	55.0F	7.3	310	--	--	--	--	--	--	--	--	--	--				
0910	0000	12.8C															S	
07/12/79	5050	55.0F	7.3	300	--	--	--	--	--	--	--	--	--	--				
0940	0000	12.8C															S	
08/15/80	5050	55.0F	7.2	310	--	--	--	--	--	--	--	--	--	--				
0935	0000	12.8C															S	
08/13/81	5050	57.0F	7.5	315	--	--	--	--	--	--	--	--	--	--				
0840	0000	13.9C															S	
08/19/82	5050	56.0F	7.3	320	31	13	12	2.3	140	--	1.0	--	.0	--	131	0.5		
0850	5050	13.3C	8.5	294	1.55	1.07	.52	.06	2.80	--	.03	--	--	--	0	0.8	S	
					48	33	16	2										

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH FC	MINERAL CONSTITUENTS IN	MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE	MILLIGRAMS PER LITER TURB SI02	TDS SUM	TH NCH	SAR ASAR	RFM						
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *						
G-12 G-12.A											NORTH LAHONTAN HB SURPRISE VALLEY HU BAKE CREEK HA					
40N/16E-36G01 M											CONTINUED					
08/23/93 0935	5050 0000	54.0F 12.2C	7.2 338	-- --	-- --	-- --	-- --	-- --	-- --							
08/10/84 0830	5050 0000	54.0F 12.2C	7.2 357	-- --	-- --	-- --	-- --	-- --	-- --	S						
08/07/85 1125	5050 0000	54.0F 12.2C	7.3 330	-- --	-- --	-- --	-- --	-- --	-- --	S						
40N/16E-36G02 M																
05/07/59 1245	5050 5050	56 F 13 C	7.9 340	33 1.65 47	12 .99 28	19 .83 23	2.9 .07 2	167 3.34 94	5.4 .11 3	2.2 .06 2	2.6 .04 1	.03 44.0	.1 221	134 0	0.7 1.3	
07/16/69 1020	5050 5050	65.0F 18.3C	7.7 260	-- --	-- --	21 .91 29	-- --	-- --	-- --	-- --	-- --	.0 --	-- --	110		S
08/25/82 0830	5050 0000	60.0F 15.5C	7.3 285	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --		
08/23/83 0945	5050 0000	53.0F 11.7C	7.3 302	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --		
40N/16E-36R02 M																
09/15/71 0840	5050 5050	90 F 32 C	7.8 310 8.1 336	-- --	-- --	41 1.78 54	-- --	88 1.76	-- --	12 .34	-- --	-- --	-- --	75		S
40N/17E-18N01 M																
06/13/58 1520	5050 9551	58.0F 14.4C	8.5 155	21 1.05 50	4.0 .33 16	14 .61 29	3.4 .09 4	98 1.96 91	3.3 .07 3	4.0 .11 5	1.4 .02 1	.05 44.0	.2 154	69 0	0.7 1.0	C

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAP ASAR	REM

G G-12 G-12.A		NORTH LAHONTAN HB SURPRISE VALLEY HU BARE CREEK HA																	
40N/17E-19D03 M																			
09/09/58	5050	60.0F		10	5.0	17	4.2	103	3.1	1.0	.6	.02	.2			68	0.9		
1440	5050	15.5C	8.0 211	.95	.41	.74	.11	2.06	.06	.03	.01		43.0	155		0	1.2		
				43	19	33	5	95	3	1	0								
40N/17E-20C01 M																			
09/11/58	5050	55.0F		26	5.6	39	6.4	108	36	22	1.0	.33	.1			88	1.8		
1240	5050	12.8C	7.6 370	1.30	.46	1.70	.16	2.16	.75	.62	.02		54.0	255		0	2.7		
				36	13	47	4	61	21	17	1								
08/26/59	5050	56.0F		26	7.1	40	6.5	117	33	22	1.0	.2	.1	270		94	1.8		E
	5000	13.3C	8.0 367	1.30	.58	1.74	.17	2.34	.69	.62	.02		64.0	270		0	2.8		
				34	15	46	4	64	19	17	1								
07/28/60	5050	55.0F		25	6.9	36	5.7	109	37	22	.5	.18	.2	257		91	1.6		F
	5050	12.8C	8.0 362	1.25	.57	1.57	.15	2.18	.77	.62	.01		59.0	258		0	2.5		
				35	16	44	4	61	22	17	0								
08/22/61	5050	58.0F		27	6.9	41	5.8	109	41	25	.5	.22	.3	270		96	1.8		F
	5050	14.4C	8.3 385	1.35	.57	1.78	.15	2.18	.85	.71	.01		57.0	270		0	2.8		
				35	15	46	4	58	23	19	0								
07/10/62	5050	56.0F	7.6	26	5.6	40	5.5	107	36	24	1.1	.18	.3	268		88	1.9		F
1035	5050	13.3C	7.8 374	1.30	.46	1.74	.14	2.14	.75	.68	.02		56.0	259		0	2.8		
				36	13	48	4	60	21	19	1								
08/07/63	5050	56.0F		24	6.3	44	6.0	117	35	22	1.2	.2	.2	264		86	2.1		E
	5050	13.3C	8.3 365	1.20	.52	1.91	.15	2.34	.73	.62	.02		48.0	257		0	3.1		
				32	14	51	4	63	20	17	1								
07/15/64	5050	57.0F		26	5.1	40	5.9	115	36	22	.6	.1	--			86	1.9		
	5050	13.9C	8.3 374	1.30	.42	1.74	.15	2.30	.75	.62	.01		--	205		0	2.8		
				36	12	48	4	63	20	17	0								
08/15/65	5050	55.0F		--	--	40	--	113	--	20	--	--	--			84			
	5050	12.8C	8.4 380	--	--	1.74	--	2.26	--	.56	--	--	--						S
						51													
08/09/67	5050	55.0F		--	--	41	--	111	--	24	--	--	--			86			
1020	5050	12.8C	8.3 384	--	--	1.78	--	2.22	--	.68	--	--	--						S
						51													
07/21/70	0000	57 F	8.1	--	--	--	--	--	--	--	--	--	--						
1600	5050	14 C	375	--	--	--	--	--	--	--	--	--	--						

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAR ASAR	REM
			PH	EC	CA	MG	NA	K	PERCENT CACD3	REACTANCE SO4	VALUE CL	NO3	TURB	B SiO2	F TDS SUM	TH NCH		

	G G-12 G-12.4		NORTH LAHONTAN HB SURPRISE VALLEY HII BAPE CREEK HA															
	40N/17E-20C01 M																	
09/15/71	5050	56 F	7.7	365	--	--	--	--	107	CONTINUED							93	
1130	5050	13 C	8.1	362					2.14	--	22	--	--	--				
											.62							
09/13/72	5050	56.0F	7.9	380	--	--	--	--	--	--	--	--	--	--				
1215	0000	13.3C																
09/13/73	5050	56.0F	7.9	380	--	--	--	--	--	--	--	--	--	--				
1215	0000	13.3C																
07/17/74	5050	58.0F	8.0	380	--	--	--	--	--	--	--	--	--	--				
1730	0000	14.4C																
08/15/80	5050	58.0F	8.1	445	28	7.0	41	6.5	102	55	27	.6	.2	--	286	99	1.8	
1000	5050	14.4C	8.1	406	1.40	.58	1.78	.17	2.04	1.15	.76	.01	--	226	0	2.7	F	
					36	15	45	4	52	29	19	0					T	
	40N/17E-30H01 M																	
09/09/88	5050	64.0F			28	7.3	64	7.4	42	135	42	.5	.88	1.5		100	2.8	
1510	5050	17.8C	7.7	552	1.40	.60	2.78	.19	.84	2.81	1.18	.01	50.0	360	58	3.1		
					28	12	56	4	17	58	24	0						
	40N/17E-30P03 M																	
08/25/82	5050	67.0F	7.8	310	15	4.0	43	4.0	82	--	15	--	.4	1.1		54	2.5	
0850	5050	19.4C	7.7	314	.75	.33	1.87	.10	1.64		.42		--		0	3.0		
					25	11	61	3									S	
	40N/17E-30R01 M																	
08/25/82	5050	63.0F	8.1	265	--	--	--	--	--	--	--	--	--	--				
0910	0000	17.2C																
08/23/83	5050	62.0F	7.9	260	--	--	--	--	--	--	--	--	--	--				
1015	0000	16.7C																

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER				MILLIGRAMS PER LITER								
			LABORATORY	PH	EC	CA	MG	NA	K	MILLIEQUIVALENTS PER LITER											
										PERCENT REACTANCE VALUE					TURB	SI02	TDS	TH	SAR	RFM	

G-12		NORTH LAHONTAN HR																			
G-12.A		SURPRISE VALLEY HU																			
G-12.A		BARE CREEK HA																			
40N/17E-31M01 M																					
09/09/38	5050	53.0F		22	10	9.0	2.0	112	28	1.0	2.6	.06	.0	98	0.4						
1610	5050	11.7C	8.0 228	1.10	.82	.39	.05	2.24	.58	.03	.04		32.0	174	0	0.6					
				47	35	17	2	78	20	1	1							S			
09/15/71	5050	51 F	7.1 245	--	--	--	--	119	--	.8	--	--	--	115							
0815	5050	11 C	7.9 250					2.38		.92								S			
09/13/72	5050	51.0F	7.1 265	--	--	--	--	--	--	--	--	--	--								
1300	0000	10.5C																			
40N/17E-31P01 M																					
09/15/71	5050	60 F	7.0 345	--	--	15	--	130	--	9.0	--	--	--	161							
0910	5050	16 C	7.8 364			.65		2.60		.25								S			
						17															
08/01/73	5050	55.0F	6.9 315	--	--	--	--	--	--	--	--	--	--								
1355	0000	12.8C																			
06/30/77	5050	59.0F	7.0 375	36	14	14	2.0	125	39	9.0	3.6	.2	--	225	148	0.5					
1600	5050	15.0C	8.3 367	1.80	1.15	.61	.05	2.50	.81	.25	.06		--	193	23	0.9					
				50	32	17	1	69	22	7	2										
08/24/78	5050	58.0F	7.3 360	--	--	--	--	--	--	--	--	--	--								
0915	0000	14.4C																S			
07/12/79	5050	67.0F	7.3 385	--	--	--	--	--	--	--	--	--	--								
1000	0000	19.4C																S			
08/15/80	5050	63.0F	7.2 400	33	13	19	3.4	97	62	14	1.3	.4	--	249	136	0.7					
0945	5050	17.2C	8.0 369	1.65	1.07	.83	.09	1.94	1.29	.39	.02		--	204	39	1.2					
				45	29	23	2	53	35	11	1										

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL	CONSTITUENTS IN				MILLIGRAMS PER LITER				MILLIGRAMS PER LITER				SAR	REM
			LABORATORY PH	EC		CA	MG	NA	K	PERCENT	REACTANCE	PER LITER	PERCENT	REACTANCE	PER LITER	TDS	TH		

	G																		
	G-12																		
	G-12.A																		
	40N/17E-32E01 M																		
09/11/58	5050	60.0F			20	2.4	25	2.8	103	7.4	3.4	.6	.04	.2		60	1.4		
1320	5050	15.5C	8.0	217	1.00	.20	1.09	.07	2.06	.15	.10	.01		34.0	157	0	1.9		
					42	8	46	3	89	6	4	0							
	G-12.B																		
	35N/12E-20B01 M																		
08/09/61	5050	70 F		282	22	15	16	3.8	143	2.8	3.1	5.1	.05	.2	202	116	0.6		
	5050	21 C	8.0		1.10	1.23	.70	.10	2.86	.06	.09	.08		--	154	0	1.1		
					35	39	22	3	93	2	3	3					T		
	40N/16E-11C01 M																		
09/02/82	5050	74.0F	8.5	200	--	--	--	--	--	--	--	--	--	--					
0945	6006	23.3C												--					
	40N/16E-11G01 M																		
09/09/58	5050	54.0F			24	6.1	13	1.8	109	2.8	.0	1.7	.06	.0		85	0.6		
1340	5050	12.2C	8.0	222	1.20	.50	.57	.05	2.18	.06	.00	.03		26.0	141	0	0.9		
					52	22	25	2	96	3	0	1							
08/26/59	5050				24	6.3	14	1.7	110	3.0	2.0	.9	.1	.1	144	86	0.7		
	5050		8.2	210	1.20	.52	.61	.04	2.20	.06	.06	.01		26.0	144	0	1.0		
					51	22	26	2	94	3	3	0							
07/28/60	5050	55.0F			25	6.0	12	1.9	111	.0	4.0	2.0	--	.0	136	86	0.6		
	5050	12.8C	8.0	220	1.25	.49	.52	.05	2.22	.00	.11	.03		18.0	135	0	0.9		
					54	21	23	2	94	0	5	1							
08/22/61	5050	58.0F			26	5.1	13	1.7	108	.6	1.9	1.2	.06	.1	140	86	0.6		
	5050	14.4C	8.1	211	1.30	.42	.57	.04	2.16	.01	.05	.02		25.0	139	0	0.9		
					56	18	24	2	96	0	2	1							
07/10/62	5050	56.0F	7.6		24	5.6	12	1.8	106	1.3	1.2	1.4	.04	.0	138	83	0.6		
1150	5050	13.3C	8.1	208	1.20	.46	.52	.05	2.12	.03	.03	.02		26.0	137	0	0.9		
					54	21	23	2	96	1	1	1							
08/07/63	5050				24	4.5	13	1.6	108	1.4	.0	1.6	.1	.1	128	80	0.6		
	5050		8.2	205	1.20	.37	.57	.04	2.16	.03	.00	.03		20.0	131	0	0.9		
					55	17	26	2	97	1	0	1							
07/15/64	5050				--	--	13	--	108	--	.0	--	--	--		84			
	5050		8.4	212			.57	--	2.16		.00	--	--	--					
							25												

[illegible]

NORTH LAHONTAN HB
SURPRISE VALLEY HU
CEDARVILLE HA

CONTINUED

[illegible]

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM

	G G-12 G-12.8		NORTH LAMONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																
	40N/16E-13G01 M																		
09/13/72 1125	5050 0000	58.0F 14.4C	7.6 225	--	--	--	--	--	--	--	--	--	--	--	--				S
08/25/82 1020	5050 5050	57.0F 13.9C	7.8 218	22 1.10 48	5.0 .41 18	16 .70 30	4.1 .10 4	114 2.28	-- .03	1.0 --	-- --	-- --	-- --			76 0	0.8 1.2		S
	40N/16E-13J01 M																		
06/02/56 1310	5050 5000	55.0F 12.8C	7.3 212	25 1.25 53	6.5 .53 23	11 .48 20	3.7 .09 4	112 2.24 97	2.6 .05 2	.6 .02 1	.5 .01 0	.00 41.0	.0 --			158 158	89 0	0.5 0.8	
84 08/25/82 1030	5050 5000	60.0F 15.5C	7.8 240	--	--	--	--	--	--	--	--	--	--	--	--				
08/23/83 1315	5050 0000	59.0F 15.0C	7.8 240	--	--	--	--	--	--	--	--	--	--	--	--				
	40N/16E-13R01 M																		
06/02/56 1233	5050 5000	55 F 13 C	7.3 212	25 1.25 53	6.5 .53 23	11 .48 20	3.7 .09 4	112 2.24 97	2.6 .05 2	.6 .02 1	.5 .01 0	.00 41.0	.0 --			158 158	89 0	0.5 0.8	
06/13/58 1550	5050 0551	54.0F 12.2C	8.5 165	25 1.25 55	5.9 .49 22	10 .44 19	3.0 .08 4	108 2.16 92	2.3 .05 2	4.0 .11 5	2.0 .03 1	.05 41.0	.2 --			158 158	87 0	0.5 0.7	C
08/26/59	5050 5050	55.0F 12.8C	8.0 213	26 1.30 55	6.1 .50 21	11 .48 20	3.9 .10 4	110 2.20 92	1.0 .02 1	3.5 .10 4	4.4 .07 3	.0 43.0	.1 --			165 165	90 0	0.5 0.8	E
07/28/60	5050 5050	54.0F 12.2C	8.1 213	25 1.25 55	6.2 .51 22	9.8 .43 19	3.4 .09 4	107 2.14 96	2.0 .04 2	1.0 .03 1	.9 .01 0	.05 41.0	.1 --			153 154	88 0	0.5 0.7	F
08/22/61	5050 5050	56.0F 13.3C	8.3 214	25 1.25 53	6.4 .53 23	11 .48 20	3.7 .09 4	110 2.20 96	.5 .01 0	1.9 .05 2	1.4 .02 1	.05 41.0	.1 --			157 157	89 0	0.5 0.8	E

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR ASAR	REM
				CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	F SiO2	TDS SUM	TH MCH		

	G G-12 G-12.R		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE WA														
	40N/16E-13R01 M																
07/15/64	5050			26	6.1	11	4.1	111	2.0	.5	2.7	.0	--	148	90	0.5	
	5050		8.3 222	1.30	.50	.48	.10	2.22	.04	.01	.04	--	--	119	0	0.8	
				55	21	20	4	96	2	0	2						
08/15/65	5050	52.0F		--	--	10	--	113	--	.0	--	--	--		90		
	5050	11.1C	8.5 225	--	--	.44		2.26	--	.00	--	--	--				S
						20											
08/30/66	0000			217	--	--	--	--	--	--	--	--	--				
	0000																
08/09/67	5050			--	--	11	--	--	--	1.6	--	--	--		95		
	5050		8.2 226	--	--	.48			--	.05	--	--	--				S
						20											
08/01/68	0000	54.0F	7.7 230	--	--	--	--	--	--	--	--	--	--				
	0945	12.2C															
07/16/69	5050	57.0F	7.7 230	26	6.1	11	3.5	110	1.6	2.0	2.7	.0	--	139	90	0.5	
	1130	13.9C	7.9 219	1.30	.50	.48	.09	2.20	.03	.06	.04	--	--	119	0	0.8	
				55	21	20	4	94	1	3	2						
07/22/70	0000	54 F	7.7 222	--	--	--	--	--	--	--	--	--	--				S
	0825	12 C															
09/15/71	5050	55 F	7.4 225	--	--	--	--	--	--	--	--	--	--				S
	1240	13 C															
09/13/72	5050	54.0F	7.6 237	--	--	--	--	--	--	--	--	--	--				S
	1140	12.2C															
08/26/76	5050	60.0F	7.7 240	--	--	--	--	--	--	4.9	--	--	--		81		
	0845	15.5C	236							.14		--	--				S
06/30/77	5050	60.0F	7.9 255	24	4.9	19	3.2	106	10	4.0	.7	.1	--	103	77	0.9	
	1700	15.5C	8.2 245	1.20	.33	.83	.08	2.12	.21	.11	.01	--	--	129	0	1.4	T
				49	14	34	3	67	9	4	0						

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD LABORATORY		MINERAL CONSTITUENTS IN					MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAR ASAR	REM
			PH	EC	CA	MG	NA	K	PERCENT CACO3	REACTANCE SO4	VALUE CL	NO3	TURB	SI02	TDS SUM	TH NCH			

	G G-12 G-12.B		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA																
08/25/82 1040	5050 5050	40N/16F-14K01 M	53.0F	7.8	210	24	6.0	10	2.9	109	--	1.0	--	--	--		84	0.5	
			11.7C	7.9	209	1.20	.49	.44	.07	2.18		.03		--	--		0	0.7	
						55	22	20	3										
08/25/82 0950	5050 0000	40N/16E-23B01 M	55.0F	7.4	240	--	--	--	--	--	--	--	--	--	--				
			12.8C											--	--				
08/23/83 1300	5050 5050		54.0F	7.3	240	27	7.0	--	--	108	--	3.0	--	.0	--		96		
			12.2C	7.9	238	1.35	.58			2.16		.08		--	--		0		
08/10/84 0910	5050 0000		55.0F	7.3	235	--	--	--	--	--	--	--	--	--	--				
			12.8C											--	--				
08/07/85 1110	5050 0000		55.0F	7.3	240	--	--	--	--	--	--	--	--	--	--				
			12.8C											--	--				
08/25/82 1000	5050 5050	40N/16E-24C01 M	58.0F	7.7	240	28	7.0	13	1.7	115	--	2.0	--	--	--		99	0.6	
			14.4C	7.8	240	1.40	.58	.57	.04	2.30		.06		--	--		0	0.9	
						54	22	22	2										
07/ /56	5050 5050	40N/16E-24N01 M				21	7.2	8.8	2.9	102	3.3	1.0	1.1	.0	.0	142	82	0.4	
				7.9	189	1.05	.59	.38	.07	2.04	.07	.03	.02	.0	36.0	142	0	0.6	
						50	28	18	3	94	3	1	1						
06/13/58	5050 5050	40N/16F-25R01 M	56.0F			22	8.6	13	2.4	117	2.1	3.5	2.0	.0	.3	164	90	0.6	
			13.3C	8.3	180	1.10	.71	.57	.06	2.34	.04	.10	.03		40.0	164	0	0.9	
						45	29	23	2	93	2	4	1						

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAR ASAR	REM
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT CACO3	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH		

G		NORTH LAHONTAN HB																
G-12		SURPRISE VALLEY HU																
G-12.B		CEDARVILLE HA																
41N/16F-04G01 M																		
06/14/58	5050	58.0F			25	3.2	16	.4	103	5.9	3.0	1.3	.03	.2		76	0.8	
1145	9551	14.4C	8.3	160	1.25	.26	.70	.01	2.06	.12	.08	.02		28.0	145	0	1.1	C
					56	12	32	0	90	5	4	1						
08/26/59	5050	59.0F			16	9.5	18	.7	108	7.0	1.5	.0	.1	.0	145	79	0.9	
	5000	15.0C	7.8	211	.80	.78	.78	.02	2.16	.15	.04	.00		27.0	145	0	1.3	
					34	33	33	1	92	6	2	0						
07/28/60	5050	50.0F			23	6.0	17	.3	107	3.0	6.0	1.0	.08	.0	139	81	0.8	
	5800	10.0C	8.1	226	1.15	.49	.74	.01	2.14	.06	.17	.02		19.0	140	0	1.2	
					48	21	31	0	90	3	7	1						
08/22/61	5050	60.0F			29	2.8	18	.8	105	3.4	2.3	.5	.07	.0	143	74	0.9	
00	5050	15.5C	8.3	210	1.25	.23	.78	.02	2.10	.07	.06	.01		27.0	143	0	1.3	
					55	10	34	1	94	3	3	0						
07/10/62	5050	59.0F	8.2		25	2.6	18	.8	104	4.8	1.6	.8	.06	.1	139	73	0.9	
	1300	15.0C	8.0	216	1.25	.21	.78	.02	2.08	.10	.05	.01		28.0	144	0	1.3	
					55	9	35	1	93	4	2	0						
08/12/65	5050	54.0F			25	7.4	20	1.5	132	.5	.9	.6	.03	--	166	03	0.9	
	5050	12.2C	8.6	264	1.25	.61	.87	.04	2.64	.01	.03	.01		--	135	0	1.5	
					45	22	31	1	98	0	1	0						
41N/16E-04K01 M																		
06/30/77	5050	59.0F	8.0	255	27	6.0	14	.8	116	5.0	1.0	1.8	.0	--	143	92	0.6	
	5050	15.0C	8.5	243	1.35	.49	.61	.02	2.32	.10	.03	.03		--	125	0	1.0	
					55	20	25	1	94	4	1	1						
08/23/78	5050	62.0F	8.1	240	--	--	--	--	--	--	--	--	--	--				
	1525	16.7C																
08/12/81	5050	64.0F	8.2	235	24	5.0	16	1.4	111	--	1.0	--	--	--		80	0.8	
	0740	17.8C	8.1	222	1.20	.41	.70	.04	2.22		.03			--		0	1.2	
					51	17	30	2										
08/07/85	5050	59.0F	7.8	235	--	--	--	--	--	--	--	--	--	--				
	0945	15.0C												--				

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD		PH	EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAR ASAR	RFM
			LABORATORY	LABORATORY			CA	MG	NA	K	PERCENT REACTANCE VALUE		TURB	F	TDS	TH				
											CACO3	SO4					CL	NO3		

	G G-12 G-12.9		NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																	
08/25/82 1425	5050	55.0F	8.0	275	30	6.0	18	1.5	112	--	1.0	--	.1	.1		100	0.8			
	5050	13.3C	7.9	268	1.50	.49	.78	.04	2.24		.03		--			0	1.2			
					53	17	28	1										S		
08/07/85 1060	5050	58.0F	7.9	270	--	--	--	--	--	--	--	--	--	--						
	0060	14.4C											--	--				S		
08/25/82 1415	5050	58.0F	8.2	195	23	3.0	15	.9	90	--	1.0	--	--	--		70	0.8			
	5050	14.4C	7.9	198	1.15	.25	.65	.02	1.80		.03		--	--		0	1.0			
					56	12	31	1										S		
07/15/54 1035	5050				14	5.8	19	2.3	94	5.6	1.0	.8	.06	.0		59	1.1			
	5060	7.9	190	.70	.48	.83	.06	1.88	.12	.03	.01		36.0		141	0	1.4			
					34	23	40	3	92	6	1	0								
08/25/82 1440	5050	59.0F	8.0	255	24	7.0	20	2.4	106	--	1.0	--	.0	.1		89	0.9			
	5050	15.0C	7.9	261	1.20	.58	.87	.06	2.12		.03		--	--		0	1.4			
					44	21	32	2										S		
07/15/54 1309	5050	58 F	7.9	190	14	5.8	19	2.3	94	5.6	1.0	.8	.06	.0		59	1.1			
	5000	14 C			.70	.48	.83	.06	1.88	.12	.03	.01		36.0		141	0	1.4		
					34	23	40	3	92	6	1	0								
06/14/58 1245	5050	58.0F			18	3.0	61	1.4	50	94	33	1.4	.48	.9		56	3.5			
	9551	14.4C	8.2	300	.90	.25	2.65	.04	1.00	1.96	.93	.02		30.0		272	8	3.4		
					23	7	69	1	26	50	24	1						C		
08/26/50 0940	5050	60.0F			17	4.3	60	1.6	49	90	35	.3	.5	.3		60	3.4			
	5080	15.5C	7.6	411	.85	.35	2.61	.04	.98	1.87	.49	.00		30.0		269	11	3.3		
					22	9	68	1	26	49	26	0								
07/28/60 0900	5050	59.0F			16	7.0	8.0	.7	80	.0	7.0	4.0	.0	.0		71	0.4			
	5050	15.0C	7.9	179	.80	.56	.35	.02	1.60	.00	.20	.06		26.0		117	0	0.5		
					46	33	20	1	86	0	11	3								

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

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DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN					MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER					SAR	REM	
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT CACO3	SO4	CL	NO3	TURB	SIO2	TDS SUM	TH NCH	ASAR				

G			NORTH LAHONTAN HA																		
G-12			SURPRISE VALLEY HU																		
G-12.B			CEDARVILLE HA																		
41N/16E-25C03 M																					
08/26/76	5050	58.0F	8.2	185	--	--	--	--	--	--	--	--	--	--	--	--	--	--			
1410	0000	14.4C																			
CONTINUED																					
06/30/77	5050	125.6F	8.1	215	6.0	1.0	34	1.4	70	15	4.0	.1	.2	--	144	19	3.4				
1500	5050	52.0C	8.3	197	.30	.08	1.48	.04	1.40	.31	.11	.00	--	--	104	0	2.3				
					16	4	78	2	77	17	6	0									
08/24/78	5050	57.0F	8.1	200	--	--	--	--	--	--	--	--	--	--							
0800	0000	13.9C																			
07/12/77	5050	57.0F	8.1	185	--	--	--	--	--	--	--	--	--	--							
0840	0000	13.9C																			
08/14/80	5050	58.0F	8.2	200	--	--	--	--	--	--	--	--	--	--							
1445	0000	14.4C																			
08/13/81	5050	58.0F	8.2	190	--	--	--	--	--	--	--	--	--	--							
0750	0000	14.4C																			
08/19/82	5050	57.0F	8.1	185	5.0	1.0	33	2.1	66	--	3.0	--	--	--		16	3.6				
0800	5050	13.9C	8.5	180	.25	.08	1.44	.05	1.32		.08		--	--		0	2.1				
					14	4	79	3													
41N/16E-27D01 M																					
08/25/82	5050	68.0F	8.0	205	23	5.0	12	3.1	99	--	1.0	--	--	--		78	0.6				
1205	5050	20.0C	7.8	209	1.15	.41	.52	.08	1.98		.03		--	--		0	0.8				
					53	19	24	4													
41N/16E-34H01 M																					
06/14/58	5050	49.0F			11	2.0	5.0	1.3	42	1.1	.0	4.8	.04	.2		35	0.4				
1350	9551	9.4C	8.0	75	.55	.16	.22	.03	.84	.02	.00	.08				0	0.3				
					57	17	23	3	89	2	0	9		21.0		71					

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL	CONSTITUENTS IN				MILLIGRAMS PER LITER				MILLIEQUIVALENTS PER LITER				PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR ASAR	REM
			LABORATORY PH	EC		CA	MG	NA	K	CAC03	SD4	CL	NO3	TURB	SI02	TDS SUM	TH NCH	F	B								

G		NORTH LAHONTAN HB																									
G-12		SURPRISE VALLEY HU																									
G-12.8		CEDARVILLE HA																									
41N/16E-35D01 M																											
06/14/58	5050	50.0F		19	8.1	10	.8	105	2.5	.5	--	.02	.2		80	0.5											
1435	9551	10.0C	7.8 145	.95	.67	.44	.02	2.10	.05	.01			23.0	127	0	0.7								S			
				46	32	21	1																				
41N/16E-35D02 M																											
07/10/62	5050	56.0F	7.4	29	10	11	2.2	133	2.8	1.2	2.6	.05	.1	180	115	0.4											
0950	5050	13.3C	8.3 262	1.45	.82	.48	.06	2.66	.06	.03	.04		34.0	173	0	0.8											
				52	29	17	2	95	2	1	1																
07/15/64	5050	58.0F		26	13	14	2.3	140	4.0	1.0	2.6	.0	--		119	0.6											
	5050	14.4C	7.9 286	1.30	1.07	.61	.06	2.80	.08	.03	.04		--	147	0	1.0											
				43	35	20	2	95	3	1	1																
08/30/66	5050			16	3.6	6.2	.6	69	2.0	.8	.6	.1	--	92	15	0.7											
0950	5050		8.0 138	.86	.30	.27	.02	1.38	.04	.02	.01		--	71	0	0.4							T				
				58	22	19	1	95	3	1	1																
08/09/67	5050			--	--	9.5	--	67	--	1.0	--	--	--		56												
1120	5050		8.1 139			.41		1.34		.03			--										S				
						27																					
08/01/68	0003	58 F	7.5	--	--	--	--	--	--	--	--	--	--														
0910	5050	14 C	140										--														
07/16/69	5050	59.0F	7.5	--	--	6.8	--	--	--	1.4	--	--	.1		62												
1140	5050	15.0C	155			.30				.04			--										S				
						19																					
07/21/70	0000	58 F	7.5	--	--	--	--	--	--	--	--	--	--														
1345	5050	14 C	143										--														
09/15/71	5050	57 F	7.3	--	--	--	--	--	--	--	--	--	--														
1315	0000	14 C	138										--														
09/13/72	5050	57.0F	7.3	--	--	--	--	--	--	--	--	--	--														
1045	0000	13.9C	143										--														
08/01/73	5050	57.0F	7.5	--	--	--	--	--	--	1.2	--	--	--		55												
1535	5050	13.9C	155							.03			--														
			137										--														

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAP ASAR	REM		
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT REACTANCE VALUE				TURB	F SIO2	TDS SUM	TH NCH				
									CACO3	SO4	CL	NO3								

	G G-12 G-12.A		NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																	
	42N/16F-04G01 M																			
08/26/82	5050	66.0F	8.4	197	8.0	1.0	34	.7	81	--	3.0	--	--	.2		24	3.0			
1030	5050	18.9C	7.6	196	.40	.08	1.48	.02	1.62		.08		--	--		0	2.5			
					20	4	75	1									S			
	42N/16F-04K01 M																			
08/26/82	5050	68.0F	8.5	155	2.0	.0	32	.5	51	--	6.0	--	--	.3		5	6.2			
1020	5050	20.0C	7.3	152	.10	.00	1.39	.01	1.02		.17		--	--		0	0.2			
					7	0	93	1									S			
	42N/16E-04N05 M																			
08/26/82	5050	57.0F	7.8	302	--	--	--	--	--	--	--	--	--	--						
1015	0000	13.9C												--			S			
	42N/16E-04P01 M																			
06/13/58	5050	52.0F			32	20	19	1.3	171	14	8.0	14.2	.0	.2		162	0.6			
1430	9551	11.1C	7.7	260	1.60	1.64	.83	.03	3.42	.30	.23	.23		31.0	243	0	1.3			
					39	40	20	1	82	7	6	6					C			
08/26/59	5050	56.0F			36	13	23	.9	157	25	5.0	.9	.2	.0	230	144	0.8			
	5000	13.3C	8.2	338	1.80	1.07	1.00	.02	3.14	.52	.14	.01		31.0	229	0	1.6			
					46	28	26	1	82	14	4	0								
08/63/61	5050	54.0F			44	10	22	1.0	162	14	7.8	14.0	.10	.1	242	152	0.8			
	5050	12.2C	8.3	378	2.20	.82	.96	.03	3.24	.29	.22	.23		32.0	242	0	1.5			
					55	20	24	1	81	7	6	6								
07/10/62	5050	56.0F	7.4		43	13	23	1.1	171	13	8.5	14.0	.06	.1	254	160	0.8			
1435	5050	13.3C	7.8	402	2.15	1.07	1.00	.03	3.42	.27	.24	.23		34.0	252	0	1.5			
					51	25	24	1	82	6	6	6								
08/09/67	5050	59 F			30	8.8	26	.8	140	16	6.2	6.2	.1	--	184	111	1.1			
1305	5050	15 C	8.5	309	1.50	.72	1.13	.02	2.80	.33	.17	.10		--	178	0	1.8			
					45	21	34	1	82	10	5	3								
07/31/68	5050	54 F	7.3	420	--	--	24	--	186	--	5.6	--	--	--		164				
1230	5050	12 C	8.3	422			1.04		3.72		.16			--			S			
					24															
09/14/71	5050	61 F		325	32	11	23	.7	156	12	4.0	3.9	.1	--	226	125	0.8			
1250	5050	16 C	7.9	326	1.60	.90	1.00	.02	3.12	.25	.11	.06		--	180	0	1.6			
					45	26	26	1	88	7	3	2					T			

MINERAL ANALYSES OF GROUND WATER

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DATE TIME	SAMPLER LAR	TEMP	FIELD		MINERAL CONSTITUENTS IN					MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER					SAP ASAR	REM	
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT REACTANCE VALUE				R	F	TDS SUM	TH NCH					
									CACO3	SO4	CL	NO3					TURB	SIO2			
G G-12 G-12.B		NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																			
42N/16E-05F01 M																CONTINUED					
08/14/80 1230	5050 0000	57.0F 13.9C	7.8	300	--	--	--	--	--	--	--	--	--	--	--						
08/12/81 1143	5050 0000	57.0F 13.9C	8.0	300	--	--	--	--	--	--	--	--	--	--	--						
08/18/82 1150	5050 0000	58.0F 14.4C	7.9	290	--	--	--	--	--	--	--	--	--	--	--						
08/09/84 1215	5050 5050	59.0F 15.0C	7.5 8.4	339 340	36 1.80 55	9.0 .74 23	17 .74 23	--	149 2.98	--	2.0 .06	--	--	--	--	127 0	0.7 1.2				
08/07/85 0743	5050 0000	58.0F 14.4C	7.6	325	--	--	--	--	--	--	--	--	--	--	--						
42N/16E-05G01 M																					
08/26/82 1100	5050 5050	59.0F 11.7C	7.7 7.9	300 290	35 1.75 57	9.0 .74 24	13 .57 19	.9 .02 1	127 2.54	--	3.0 .08	--	--	.1 --		125 0	0.5 0.9				
42N/16E-05K01 M																					
06/15/83 1430	5050 5050	57.0F 13.9C	7.9 8.2	255 243	26 1.30 51	6.0 .49 19	17 .74 29	.9 .02 1	105 2.10 83	8.0 .17 7	3.0 .08 3	12.0 .19 7	.1 --	--	161 136	90 0	0.8 1.2				
42N/16E-06L02 M																					
08/26/89 0910	5050 5050	50.0F 10.0C	8.1	243	30 1.50 54	9.5 .78 28	11 .48 17	.6 .02 1	121 2.42 89	11 .23 8	1.0 .03 1	2.9 .05 2	.1 34.0	.1		114 0	0.4 0.7				

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MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAR	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM

				CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SIO2						

G G-12 G-12.R		NORTH LA-HONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																	
42N/16F-08E01 M																			
06/13/58 1155	5050 9551	53.0F 11.7C	7.9 135	15 .75 41	8.0 .66 36	9.0 .39 21	1.2 .03 2	86 1.72 95	2.3 .05 3	1.0 .03 2	1.4 .02 1	.10 29.0	.1	118	70 0	0.5 0.6		C	
08/11/67 0930	5050 5053		7.8 278	34 1.70 56	10 .82 27	11 .48 16	.9 .02 1	138 2.76 93	4.1 .09 3	2.8 .08 3	2.8 .05 2	.0 --	--	144 148	128 0	0.4 0.7			
07/31/68 1300	0000 5050	56 F 13 C	8.1 275	--	--	--	--	--	--	--	--	--	--						
07/17/69 0800	5050 5050	63.0F 17.2C	8.2 265 7.9 264	32 1.60 53	11 .90 30	12 .52 17	.3 .01 0	151 3.02 95	2.8 .06 2	2.2 .06 2	3.1 .05 2	.0 --	.1 --	148 154	127 0	0.5 0.8		S	
07/21/70 0930	0000 5050	59 F 15 C	7.9 280	--	--	--	--	--	--	--	--	--	--					S	
09/14/71 1315	5050 0000	63 F 17 C	8.2 258	--	--	--	--	--	--	--	--	--	--					S	
09/13/72 0730	5050 5050	60.0F 15.5C	7.9 302 7.8 289	33 1.65 52	12 .99 31	12 .52 16	.4 .01 0	144 2.88 91	2.8 .06 2	5.6 .16 5	4.1 .07 2	.0 --	--	158 156	134 0	0.5 0.8			
08/01/73 1650	5050 0000	61.0F 16.1C	8.1 290	--	--	--	--	--	--	--	--	--	--					S	
07/17/74 1320	5050 0000	58.0F 14.4C	7.7 285	--	--	--	--	--	--	--	--	--	--					S	
08/13/75 1230	5050 0000	57.0F 13.9C	7.7 305	--	--	--	--	--	--	--	--	--	--					S	
08/25/76 1200	5050 5050	63.0F 17.2C	7.8 205 8.4 209	17 .85 38	11 .90 40	11 .48 21	.7 .02 1	103 2.06 94	3.4 .07 3	1.1 .03 1	1.8 .03 1	.0 --	--	129 108	87 0	0.5 0.8			

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM

	G G-12 G-12.B		NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																
	42N/16F-08E01 M																		
06/30/77 1230	5050 0000	62.0F 16.7C	7.7 310	--	--	--	--	--	--	--	--	--	--						
08/23/78 1345	5050 0000	64.0F 17.8C	8.3 280	--	--	--	--	--	--	--	--	--	--						
07/11/79 1345	5050 5050	57.0F 13.9C	7.8 315 8.4 309	--	--	--	--	156 3.12	--	.0 .60	--	--	--			136			S
08/14/80 1330	5050 0000	56.0F 13.3C	7.7 330	--	--	--	--	--	--	--	--	--	--						S
08/12/81 1235	5050 0000	66.0F 18.9C	8.1 315	--	--	--	--	--	--	--	--	--	--						S
08/18/82 1225	5050 0000	60.0F 15.5C	7.9 310	--	--	--	--	--	--	--	--	--	--						S
	42N/16F-08F01 M																		
08/11/67 1030	5050 5050		8.2 313	35 1.75 50	15 1.23 35	11 .48 14	2.2 .06 2	153 3.06 91	6.2 .13 4	3.2 .09 3	5.0 .08 2	.0 --	--	179 169	150 0	0.4 0.7			S
07/31/68 1310	0000 5050	56 F 13 C	7.5 325	--	--	--	--	--	--	--	--	--	--						
07/17/69 0750	0000 5050	67.0F 19.4C	7.4 315	--	--	--	--	--	--	--	--	--	--						
07/21/70 1000	5050 5050	58 F 14 C	7.4 330 8.2 319	--	--	--	--	162 3.24	--	2.4 .07	--	--	--			171			S
09/14/71 1330	5050 0000	56 F 13 C	7.2 330	--	--	--	--	--	--	--	--	--	--						S

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN					MILLIGRAMS PER LITER				MILLIGRAMS PER LITER				SAR	REM
			LABORATORY PH	EC	CA	MG	NA	K	MILLIEQUIVALENTS PER LITER				TURB	SIO2	TDS SUM	TH NCH			
									PERCENT REACTANCE VALUE	SO4	CL	NO3							

	G G-12 G-12.R		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA																
	42N/16E-08F01 M									CONTINUED									
09/13/72 0735	5050 0000	73.0F 22.8C	7.4	355	--	--	--	--	--	--	--	--	--	--					S
	42N/16E-08M01 M																		
09/15/71 1715	5050 5050	51 F 11 C	7.3 7.8	245 238	--	--	--	--	119 2.38	--	.0 .00	--	--	--		119			S
	42N/16E-08M02 M																		
09/15/71 0720	5050 5050	59 F 15 C	8.4 8.4	130 126	--	--	9.2 .40 29	--	57 1.14	--	.5 .01	--	--	--		49			S
07/17/74 1330	5050 5050	59.0F 15.0C	7.3 8.2	255 249	29 1.45 57	8.6 .71 28	8.7 .38 15	.7 .02 1	123 2.46 94	4.1 .09 3	.0 .00 0	5.0 .08 3	.0 --	--	164 130	108 0	0.4 0.6	T	
08/13/75 1300	5050 5050	57.0F 13.9C	7.2 8.1	295 273	--	--	--	--	135 2.70	--	1.6 .05	7.6 .12	--	--		119			S
06/30/77 1250	5050 5050	56.0F 13.3C	7.3 8.5	270 263	30 1.50 57	9.0 .74 28	9.0 .39 15	.4 .01 0	125 2.50 95	1.0 .02 1	1.0 .03 1	5.6 .09 3	.0 --	--	167 131	112 0	0.4 0.6	T	
08/23/78 1400	5050 0000	53.0F 11.7C	7.5	255	--	--	--	--	--	--	--	--	--	--				S	
07/11/79 1250	5050 0000	56.0F 13.3C	7.3	250	--	--	--	--	--	--	--	--	--	--				S	
06/14/80 1220	5050 0000	50.0F 10.0C	7.3	270	--	--	--	--	--	--	--	--	--	--				S	
08/12/81 1245	5050 3050	55.0F 12.8C	7.2 8.1	345 325	39 1.95 55	13 1.07 30	12 .52 15	.9 .02 1	165 3.30 95	4.0 .08 2	1.0 .03 1	4.4 .07 2	.0 --	--	214 173	151 0	0.4 0.8		

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN					MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER					REF
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT REACTANCE VALUE			TURB	F SI02	TDS SUM	TH NCH	SAR ASAR			
									CACO3	SO4	CL						NO3		

	G G-12 G-12.8		NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																
	42N/16E-08M02 M																		
08/18/82	5050	54.0F	7.4	275	--	--	--	--	--	--	--	--	--	--					
1255	0000	12.2C															S		
08/09/84	5050	56.0F	7.3	265	--	--	--	--	--	--	--	--	--	--			S		
1245	0000	13.3C																	
08/07/85	5050	54.0F	7.3	270	--	--	--	--	--	--	--	--	--	--			S		
0910	0000	12.2C																	
	42N/16E-09P01 M																		
09/09/58	5050	61.0F			29	4.7	124	.5	124	1.8	169	.7	.25	.0		92	5.6		
1040	5050	16.1C	8.1	794	1.45	.39	5.39	.01	2.48	.04	4.77	.01		35.0	430	0	8.5		
					20	5	74	0	34	1	65	0							
	42N/16E-10P01 M																		
09/09/58	5050	54.0F			10	2.7	67	.5	177	.2	2.4	1.6	.23	.6		36	4.9		
1110	5050	12.2C	8.1	354	.50	.22	2.91	.01	3.54	.00	.07	.03		36.0	227	0	6.4		
					14	6	80	0	97	0	2	1							
	42N/16E-10P02 M																		
09/09/58	5050	54 F	8.1	354	10	2.7	67	.5	177	.2	2.4	1.6	.23	.6	227	36	4.9		
1348	5050	12 C			.50	.22	2.91	.01	3.54	.00	.07	.03		36.0	227	0	6.4		
					14	6	80	0	97	0	2	1							
	42N/16E-16P01 M																		
08/26/82	5050	58.0F	7.6	315	27	10	29	1.0	160	--	3.0	--	.0	.1		109	1.2		
0900	5050	14.4C	7.8	310	1.35	.82	1.26	.03	3.20		.08			--		0	2.1		
					39	24	36	1									S		
	42N/16E-17P01 M																		
08/26/82	5050	56.0F	7.7	198	23	4.0	14	1.3	92	--	2.0	--	--	--		74	0.7		
1440	5050	13.3C	7.7	196	1.15	.33	.61	.03	1.84		.06			--		0	1.0		
					54	16	29	1											

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN					MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER					MILLIGRAMS PER LITER					REM
				CA	MG	NA	K	PERCENT CACO3	REACTANCE SO4	VALUE CL	NO3	TURB	F SIO2	TDS SUM	TH NCH	SAR ASAR			

	G G-12 G-12.8		NORTH LAHONTAN HB SURPRISE VALLEY MU CEDARVILLE HA																
08/26/82 1455	5050 5050	51.0F 10.5C	7.3 7.6	190 186	20 1.00 51	6.0 .49 25	10 .44 22	1.0 .03 2	86 1.72	--	1.0 .03	--	.0 --	--	--	74 0	0.5 0.7	S	
09/09/82 1140	5050 5050	60.0F 15.5C	7.9	157	11 .55 36	.6 .05 3	21 .91 59	.8 .02 1	72 1.44 94	2.6 .05 3	.8 .02 1	1.0 .02 1	.10 24.0	.0	105	30 0	1.7 1.5	S	
08/30/82 1730	5050 5050	62.0F 16.7C	7.1 7.6	195 181	20 1.00 50	7.0 .58 29	9.0 .39 20	.7 .02 1	90 1.80	--	1.0 .03	--	--	--	--	79 0	0.4 0.6	S	
08/24/82 1605	5050 5050	57.0F 13.9C	8.1 8.1	285 284	36 1.80 59	11 .90 29	8.0 .35 11	.5 .01 0	137 2.74	--	1.0 .03	--	--	--	--	135 0	0.3 0.5	S	
08/24/83 0840	5050 0000	55.0F 12.8C	7.7	285	--	--	--	--	--	--	--	--	--	--	--	--	--	S	
08/25/82 1610	5050 5050	56.0F 13.3C	7.7 8.0	235 235	13 .65 34	6.0 .49 26	15 .65 34	4.2 .11 6	115 2.30	--	4.0 .11	--	--	--	--	57 0	0.9 1.2	S	
06/16/83 0940	5050 5050	57.0F 13.9C	7.8 8.2	225 218	26 1.30	5.0 .41	--	--	108 2.16	--	1.0 .03	--	--	--	--	86 0	--	S	
08/26/82 0845	5050 5050	61.0F 16.1C	7.5 7.8	210 210	17 .85 37	5.0 .41 18	23 1.00 44	.6 .02 1	103 2.06	--	2.0 .06	--	--	--	--	63 0	1.3 1.7	S	
08/23/83 1620	5050 0000	58.0F 14.4C	7.3	235	--	--	--	--	--	--	--	--	--	--	--	--	--	S	

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR ASAR	RFM	
			CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH					

G G-12 G-12.R		NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																	
42N/16E-21101 M																			
06/14/58	5050	55.0F		25	3.5	19	1.0	134	4.6	3.5	1.6	.05	.2		75	1.0			
0930	9551	12.8C	8.3	175	1.25	.29	.83	.03	2.68	.10	.10	.03		26.0	165	0	1.5	C	
				52	12	35	1	92	3	3	1							S	
08/26/59	5050	58.0F		25	4.3	23	.7	120	5.0	1.0	2.1	.1	.0	167	80	1.1			
	5000	14.4C	8.0	234	1.25	.35	1.00	.02	2.40	.10	.03	.03		34.0	167	0	1.7	E	
				48	13	38	1	94	4	1	1								
07/28/60	5050	56.0F		24	4.1	22	.8	116	5.4	.8	.7	.04	.0	154	77	1.1			
	5054	13.3C	8.0	230	1.20	.34	.96	.02	2.32	.11	.02	.01		26.0	153	0	1.6		
				48	13	38	1	94	4	1	0								
08/22/61	5050	57.0F		26	2.9	23	.9	116	4.0	2.3	.9	.09	.1	159	77	1.1			
	5050	13.9C	8.3	230	1.30	.24	1.00	.02	2.32	.08	.06	.01		29.0	159	0	1.7		
				51	9	39	1	94	3	2	0								
07/10/62	5050	57.0F	8.2	24	3.4	22	.8	114	4.1	1.4	1.0	.06	.0	156	74	1.1			
1345	5050	13.9C	8.0	227	1.20	.28	.96	.02	2.28	.09	.04	.02		26.0	151	0	1.6		
				49	11	39	1	94	4	2	1								
08/07/63	5050	56.0F		25	2.4	23	.8	116	3.4	.0	1.6	.1	.1	150	73	1.2			
	5050	13.3C	8.2	225	1.25	.20	1.00	.02	2.32	.07	.00	.03		21.0	147	0	1.7		
				51	8	40	1	96	3	0	1								
07/15/64	5050			--	--	22	--	116	--	.5	--	--	--		76				
	5050		8.2	232		.96		2.32		.01		--	--					S	
						39													
08/17/65	5050	56.0F		--	--	22	--	114	--	.9	--	--	--		78				
	5050	13.3C	8.5	250		.96		2.28		.03		--	--					S	
						38													
08/30/66	0000			227	--	--	--	--	--	--	--	--	--						
	0000																		
09/09/67	5050	56.0F		--	--	23	--	--	--	1.5	--	--	--		74				
1220	5050	13.3C	8.0	234			1.00			.04		--	--					S	
						40													
08/01/68	5050	60 F	8.0	240	24	3.9	23	.9	117	5.4	1.9	.8	.0	--	152	76	1.1		
0840	5050	16 C	8.4	240	1.20	.32	1.00	.02	2.34	.11	.05	.01		--	130	0	1.7		
					47	13	39	1	93	4	2	0							

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER							REM

				CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SIO2	TDS SIUM	TH NCH	SAR ASAR	PEM		

	G G-12 G-12.B		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA																
	42N/16E-28M01 M																		
06/14/58	5050	58.0F		28	6.2	18	1.2	172	4.0	3.5	2.9	.05	.2		95	0.8			
1005	9551	14.4C	8.4	185	1.40	.51	.78	.03	3.44	.08	.10	.05	25.0	192	0	1.4		C	
				51	19	29	1	94	2	3	1						S		
	42N/16E-28M02 M																		
08/25/82	5050	68.0F	7.4	275	32	8.0	17	1.1	137	--	1.0	--	--		113	0.7			
1545	5050	20.0C	8.1	278	1.60	.66	.74	.03	2.74		.03		--		0	1.2		S	
				53	22	24	1												
	42N/16E-29M02 M																		
09/16/71	5050	54 F	7.3	205	--	--	--	--	101	--	.0	--	--		86				
1115	5050	12 C	8.2	208					2.02		.00		--					S	
09/13/72	5050	56.0F	7.3	228	--	--	--	--	--	--	--	--	--						
0850	0000	13.3C											--						
07/17/74	5050	52.0F	7.2	205	26	5.1	9.4	.6	98	3.4	.0	2.5	.0	--	137	86	0.4		
1430	5050	11.1C	8.2	196	1.30	.42	.41	.02	1.96	.07	.00	.04	--	106	0	0.6		T	
				60	20	19	1	95	3	0	2								
08/13/75	5050	66.0F	7.9	222	--	--	--	--	--	--	--	--	--						
1345	0000	18.9C											--					S	
08/25/76	5050	56.0F	7.4	210	--	--	--	--	--	--	--	--	--						
1310	0000	13.3C											--					S	
08/23/78	5050	56.0F	7.4	218	28	4.0	15	.7	112	4.2	.5	1.4	.0	--	139	86	0.7		
1430	5050	13.3C	8.3	226	1.40	.33	.65	.02	2.24	.09	.01	.02	--	121	0	1.1			
				58	14	27	1	95	4	0	1								
07/12/79	5050	53.0F	7.4	220	--	--	--	--	--	--	--	--	--						
0730	0000	11.7C											--						
08/14/80	5050	54.0F	7.3	235	--	--	--	--	--	--	--	--	--						
1330	0000	12.2C											--						

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER							RFM
				CA	MG	NA	K	CAC03	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH	SAR ASAR	RFM		

G G-12 G-12.B		NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																	
42N/16E-29A02 M		CONTINUED																	
08/12/81 1305	5050 0000	58.0F 14.4C	7.7 230	--	--	--	--	--	--	--	--	--	--	--					
08/18/82 1310	5050 0000	55.0F 12.8C	7.5 220	--	--	--	--	--	--	--	--	--	--	--					
08/09/84 1435	5050 5050	52.0F 11.1C	7.3 187 8.2 196	23 1.15 57	5.0 .41 20	10 .44 22	.6 .02 1	90 1.80 94	3.0 .06 3	1.0 .03 2	1.8 .03 2	.0 --	--	126 98	78 0	0.5 0.7	T		
08/07/85 0925	5050 0000	52.0F 11.1C	7.4 190	--	--	--	--	--	--	--	--	--	--	--					
42N/16E-29G01 M																			
09/16/71 0810	5050 5050	50 F 10 C	7.0 7.8	167 165	--	--	10 .44 26	77 1.54	--	.0 .00	--	--	--	--	64		S		
07/17/74 1410	5050 5050	52.0F 11.1C	7.1 185 8.1 174	22 1.10 58	3.6 .30 16	11 .48 25	.3 .01 1	84 1.68 94	3.8 .08 4	.0 .00 0	2.0 .03 2	.0 --	--	116 93	70 0	0.6 0.8			
08/13/75 1400	5050 0000	52.0F 11.1C	7.1 195	--	--	--	--	--	--	--	--	--	--	--			S		
06/30/77 1410	5050 5050	53.0F 11.7C	7.1 180 8.2 170	19 .95 58	3.0 .25 15	10 .44 27	.2 .01 1	80 1.60 95	2.0 .04 2	1.0 .03 2	1.4 .02 1	.0 --	--	101 95	60 0	0.6 0.7			
08/23/78 1445	5050 0000	63.0F 17.2C	7.1 180	--	--	--	--	--	--	--	--	--	--	--			S		
07/12/79 0740	5050 0000	54.0F 12.2C	7.0 190	--	--	--	--	--	--	--	--	--	--	--			S		
08/14/80 1415	5050 5050	72.0F 22.2C	7.0 400 8.1 370	49 2.45 64	8.0 .66 17	16 .70 18	.6 .02 1	135 2.70 70	49 1.02 26	1.0 .03 1	7.1 .11 3	.0 --	--	243 212	155 21	0.6 1.0			

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER						REM
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT CACO3	REACTANCE SO4	VALUE CL	NO3	TURB	F SIO2	TDS SUM	TH NCH	SAR ASAR		

MINERAL ANALYSES OF GROUND WATER

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DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER						
					CA	MG	NA	K	PERCENT CACD3	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH	SAR ASAP	

	G G-12 G-12.B		NORTH LAMONTAN HR SUNNYSIDE VALLEY HW CEDARVILLE HA															
	42N/16E-29L01 M																	
08/24/82 1520	5050 5050	60.0F 15.5C	7.9 8.0	260 262	32 1.60 57	6.0 .49 17	16 .70 25	1.2 .03 1	125 2.50	-- .03	1.0 --	-- --	.1 --	.1 --		105 0	0.7 1.1	
08/24/83 0935	5050 0000	60.0F 15.5C	7.8	258	--	--	--	--	--	--	--	--	--	--				
	42N/16E-33R02 M																	
08/25/82 1525	5050 5050	57.0F 13.9C	7.3 7.9	240 235	24 1.20 48	6.0 .49 20	18 .78 31	1.7 .04 2	118 2.36	-- .03	1.0 --	-- --	-- --	--		84 0	0.9 1.3	
08/24/83 1055	5050 0000	55.0F 12.8C	7.3	230	--	--	--	--	--	--	--	--	--	--				
	42N/16E-33J01 M																	
06/14/58 1035	5050 9551	50.0F 10.0C	8.3	165	19 .95 41	5.9 .49 21	19 .83 36	.6 .02 1	110 2.20 94	2.8 .06 3	2.0 .04 3	1.7 .03 1	.08 25.0	.2		72 0	1.0 1.4	
	42N/16E-33M03 M																	
09/09/78 0850	5050 5050	64.0F 17.8C	8.1	263	17 .85 28	.4 .03 1	48 2.00 70	.6 .02 1	125 2.50 85	17 .35 12	2.0 .06 2	2.6 .04 1	.07 24.0	.1		44 0	3.1 4.0	
	42N/16E-34F01 M																	
06/14/58 1105	5050 9551	58.0F 14.4C	8.5	200	14 .70 23	7.1 .58 19	37 1.61 54	3.4 .09 3	135 2.70 94	1.0 .02 1	4.0 .11 4	1.7 .03 1	.08 36.0	.4		65 0	2.0 2.9	
08/26/59	5050 5000	59.0F 15.0C	7.9	259	16 .80 28	2.9 .24 8	40 1.74 60	4.0 .10 3	133 2.66 93	3.0 .06 2	3.0 .08 3	3.3 .05 2	.1 40.0	.0		192 192	52 0	2.4 3.3
07/28/60	5050 5050	58.0F 14.4C	8.3	260	14 .70 24	3.6 .30 10	41 1.78 62	3.1 .08 3	82 1.64 96	1.0 .02 1	1.6 .05 3	.1 .00 0	.09 38.0	.1		184 152	50 0	2.5 2.9
08/22/61	5050 5050	60.0F 15.5C	8.3	267	16 .80 27	2.7 .22 8	42 1.83 63	2.7 .07 2	139 2.78 97	1.2 .02 1	2.8 .08 3	.2 .00 0	.12 36.0	.1		188 187	51 0	2.6 3.5

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLED LAB	TEMP	FIELD LABORATORY		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	RFM
			PH	EC	CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SiO2	B	F				

G G-12 G-12.8			NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																	
42N/16E-34F01 M																				
07/10/62 1330	5050	61.0F	8.4		14	3.4	48	3.1	153	.2	1.5	.5	.10	.1	208	49	3.0			
	5050	16.1C	8.2	300	.70	.28	2.09	.08	3.06	.00	.04	.01		38.0	201	0	4.2			
					22		9	66	3	98	0	1	0							
08/07/63	5050	60.0F			15	2.6	47	2.8	148	.0	.0	2.8	.1	.1	194	48	3.0	E		
	5050	15.5C	8.3	265	.75	.21	2.04	.07	2.96	.00	.00	.05		26.0	185	0	4.1			
					24		7	66	2	98	0	0	2							
07/15/64	5050				--	--	57	--	173	--	.7	--	--	--		53				
	5050		8.2	238			2.48		3.46		.02		--	--				S		
							70													
08/15/65	5050	58.0F			--	--	62	--	175	--	3.3	--	--	--		50				
	5050	14.4C	8.4	350			2.70		3.50		.09		--	--				S		
							73													
08/30/66 1030	5050			331	--	--	--	--	--	--	--	--	--	--						
	5050																			
08/09/67 1210	5050				--	--	47	--	--	--	3.1	--	--	--		49				
	5050		8.2	282			2.04				.09		--	--				S		
							68													
08/01/68 0900	5050		8.1	345	14	3.2	61	--	176	--	2.8	--	--	--		48	3.8			
	5050		8.2	359	.70	.26	2.65		3.52		.08		--	--		0	5.5	S		
					18		7	68												
07/16/69 1230	5050	62.0F	6.1	295	--	--	48	--	--	--	3.1	--	--	--		55				
	5050	16.7C		286			2.09				.09		--	--				S		
							66													
07/22/70 0745	0630	59 F	8.1	278	--	--	--	--	--	--	--	--	--	--						
	5050	15 C																S		
09/16/71 1100	5050	61 F	8.0	310	--	--	--	--	--	--	--	--	--	--						
	0600	16 C																S		
09/13/72 1100	5050	61.0F	8.0	345	--	--	--	--	--	--	--	--	--	--						
	0600	16.1C																		

III

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN					MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER					REM	
				CA	MG	NA	K		CACO3	SO4	CL	NO3	TURB	B SIO2	F	TDS SUM	TH NCH	SAR ASAR	REM

G G-12 G-12.R		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA																	
42N/16E-34F01 M																			
08/01/73	5050	62.0F	8.1	310	--	--	--	--	--	--	1.4	--	--	--	--	50			
1720	5050	16.7C		288							.04			--	--				S
07/17/74	5050	68.0F	8.3	300	--	--	--	--	--	--	--	--	--	--	--				S
1445	0000	20.0C												--	--				S
08/13/75	5050	69.0F	8.1	345	--	--	--	--	--	--	--	--	--	--	--				S
1410	0000	20.5C												--	--				S
08/25/76	5050	63.0F	8.3	320	--	--	--	--	--	--	--	--	--	--	--				S
1330	0000	17.2C												--	--				S
06/30/77	5050	67.0F	8.3	345	14	3.0	58	2.4	174	.0	.0	2.7	.1	--	--	226	48	3.6	
1430	5050	19.4C	8.6	355	.70	.25	2.52	.06	3.48	.00	.00	.04		--	--	185	0	5.2	
					20	7	71	2	99	0	0	1							
08/23/78	5050	63.0F	8.2	380	--	--	--	--	--	--	--	--	--	--	--				
1500	0000	17.2C												--	--				
07/12/79	5050	59.0F	8.2	295	--	--	--	--	137	--	.0	--	--	--	--	42			S
0750	5050	15.0C	8.4	263					2.74		.00			--	--				S
08/14/80	5050	67.0F	8.2	290	--	--	--	--	--	--	--	--	--	--	--				S
1445	0000	19.4C												--	--				S
08/12/81	5050	65.0F	8.4	280	--	--	--	--	--	--	--	--	--	--	--				S
1340	0000	18.3C												--	--				S
08/18/82	5050	66.0F	8.3	290	--	--	--	--	--	--	--	--	--	--	--				S
1350	0000	18.9C												--	--				S
08/24/83	5050	66 F	8.1	260	--	--	--	--	--	--	--	--	--	--	--				S
	0000	19 C												--	--				S

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT CACO3	PERCENT SD4	PERCENT CL	PERCENT NO3	TURB	F SID2						
NORTH LAHONTAN HR SURPRISE VALLEY HU CEDARVILLE HA																				
09/09/58	5050	54.0F	8.0	271	1.6	1.9	56	2.4	134	1.0	.5	.2	.09	.1		12	7.0			
0950	5050	12.2C			.08	.16	2.44	.06	2.68	.02	.01	.00		51.0	195	0	5.2			
42N/16E-34P01 M																				
10/20/82	5050	7.4	1054	66	19	127	11	276	--	98	--	.8	.3		243	3.5				
1645	5050	8.2	1020	3.29	1.56	5.52	.28	5.51		2.76		--	--		0	8.0				
42N/17E-02N01 M																				
06/02/56	5050	56.0F			13	3.3	86	7.1	172	32	25	.0	.5	.6	327	46	5.5			
	5050	13.3C	7.5	168	.65	.27	3.74	.18	3.44	.67	.71	.00		57.0	327	0	7.7			
42N/17E-06A01 M																				
05/07/59	5050	184.0F			17	.1	267	5.8	45	300	188	.9	5.3	5.9		43	17.7			
0915	5050	84.4C	8.5	1410	.85	.01	11.61	.15	.90	6.25	5.30	.01		82.0	893	0	12.4			
42N/17E-06L01 M																				
09/04/57	5050	198.0F			19	.4	270	5.6	53	305	187	4.6	5.9	4.6	940	49	16.8			
	5050	92.1C	8.5	1390	.95	.03	11.75	.14	1.06	6.35	5.27	.08		99.9	929	0	13.8			
42N/17E-06P M																				
08/13/54	5050	198.0F			17	.5	284	5.8	50	308	191	.6	5.8	.1		45	18.4			
1315	5000	92.1C	8.2	1410	.85	.04	12.35	.17	1.00	6.41	5.39	.01		97.0	941	0	14.0			
42N/17E-06P01 M																				
09/04/57	5050	198 F	8.9	1390	20	.5	270	6.0	63	301	187	4.8	5.90	4.6	948	52	16.3			
1415	5050	92 C			1.00	.04	11.75	.15	1.26	6.27	5.27	.08		96.9	933	0	15.1			
42N/17E-06P01 M																				
08/30/82	5050	172.4F	8.5	1390	17	.0	266	5.9	46	--	183	--	4.9	5.8		42	17.9			
1610	5050	78.0C	7.9	1440	.85	.00	11.57	.15	.92		5.16		--	--		0	12.5			
42N/17E-06P01 M																				
06/15/83	5050	181.4F	8.7	1400	17	.0	--	--	45	308	187	--	--	--		42				
1130	5050	83.0C	8.4	1380	.85	.00	--	--	.90	6.41	5.27	--	--	--		0				

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER						REM
				CA	MG	NA	K	CACO3	SO4	CL	NO3	B TURB	F SIO2	TDS SUM	TH NCH	SAR ASAR		

	G G-12 G-12.B			NORTH LAMONTAN HB SURPRISE VALLEY HU CEDARVILLE HA														
	42N/17E-10H01 M																	
08/26/59	5050	52.0F		39	14	320	11	312	185	231	2.1	4.3	1.2		157	11.1		
1535	5000	11.1C	8.2 1660	1.95	1.15	13.92	.28	6.23	3.85	6.51	.03		71.0	1064	0	23.0		
				11	7	80	2	37	23	39	0						S	
	43N/16E-04H01 M																	
09/10/58	5050	57.0F		61	14	235	8.6	188	198	243	2.6	.93	.4		212	7.0		
1310	5050	13.9C	7.9 1540	3.04	1.15	10.22	.22	3.76	4.12	6.85	.04		54.0	930	22	14.0		
				21	8	70	2	25	28	46	0							
	43N/16E-05N01 M																	
08/26/59	5050	54 F	223	25	6.7	14	1.0	120	1.0	.2	.0	.0	.1	157	90	0.6		
	5050	12 C	7.4	1.25	.55	.61	.03	2.40	.02	.01	.00		37.0	157	0	1.0		
				51	23	25	1	99	1	0	0							
	43N/16E-08G01 M																	
08/31/82	5050	60.0F	8.1 268	--	--	--	--	--	--	--	--	--	--					
0900	0000	15.5C											--					
	43N/16E-12D01 M																	
05/05/59	5050	184.0F		30	1.2	305	10	55	373	220	1.6	8.0	4.0		80	14.8		
1100	5050	84.4C	8.0 1670	1.50	.10	13.27	.26	1.10	7.77	6.20	.03		99.9	1042	25	15.4		
				10	1	88	2	7	51	41	0							
10/21/82	5050		8.3 1700	31	.6	313	10	45	--	218	--	6.6	6.0		78	15.4		
1010	5050		7.9 1660	1.55	.00	13.62	.26	.90		6.15			--		33	14.5	S	
				10	0	88	2											
06/16/83	5050	158.0F	8.6 1675	31	.0	--	--	51	392	220	--	--	--		78			
1405	5050	70.0C	8.3 1630	1.55	.00			1.02	8.16	6.20			--		27		S	
	43N/16E-13B01 M																	
05/05/54	5050	104.0F		17	2.6	370	5.7	141	386	225	1.4	7.3	4.0		53	22.1		
1030	5050	40.0C	8.1 1840	.85	.21	16.10	.15	2.82	8.04	6.35	.02		59.0	1159	0	27.7		
				5	1	93	1	16	47	37	0							
07/13/54	5050	105.0F		10	6.7	374	7.0	143	393	218	.1	5.7	2.2		52	22.6		
1540	5000	40.5C	7.8 1780	.50	.55	16.27	.16	2.86	8.18	6.15	.00		71.0	1171	0	28.2		
				3	3	93	1	17	48	36	0							
05/05/59	5050	104 F	8.1 1840	17	2.6	370	5.7	141	386	225	1.4	7.3	4.0	1160	53	22.1		
1436	5050	40 C		.85	.21	16.10	.15	2.82	8.04	6.35	.02		59.0	1159	0	27.7		
				5	1	93	1	16	47	37	0							

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAR ASAR	REM	
			LABORATORY PH	EC	CA	MG	NA	K	PERCENT REACTANCE VALUE				B TURR	F SIO2	TDS SUM	TH NCH			
									CAO3	SO4	CL	NO3							

	C		NORTH LAHONTAN HB																
	G-12		SURPRISE VALLEY HU																
	G-12.B		CEDARVILLE HA																
	43N/16E-16L01 M																		
09/10/58	5050	68.0F			2.4	1.7	27	1.1	56	12	3.0	.0	.3	.1		13	3.3		
1230	5050	20.0C	8.1	134	.12	.14	1.17	.03	1.12	.25	.08	.03		39.0	120	0	1.4		
					8	10	80	2	77	17	6	0							
	43N/16E-18E01 M																		
09/01/82	5050	61.0F	7.2	198	27	8.0	11	.4	95	--	1.0	--	.1	--		101	0.5		
0920	5050	16.1C	7.8	194	1.35	.66	.48	.01	1.90		.03		--	--		6	0.7		
					54	26	19	0										S	
06/15/83	5050	53.0F	7.5	215	23	8.0	--	--	96	--	1.0	--	.0	.2		90			
1245	5050	11.7C	8.1	204	1.15	.66			1.92		.03		--	--		0		S	
																		S	
08/09/84	5050	65.0F	7.3	195	--	--	--	--	--	--	--	--	--	--				S	
1140	0000	18.3C																S	
																		S	
08/06/85	5050	62.0F	7.1	215	--	--	--	--	--	--	--	--	--	--				S	
1625	0000	16.7C																S	
																		S	
	43N/16E-18F01 M																		
08/30/82	5050	51.0F	7.7	240	23	7.0	8.0	.5	120	--	1.0	--	--	--		86	0.4		
1530	5050	10.5C	7.9	238	1.15	.58	.35	.01	2.40		.03		--	--		0	0.6	S	
					55	28	17	0										S	
	43N/16E-20R01 M																		
06/07/58	5050	63.0F			4.3	.1	56	1.6	126	5.8	2.0	5.4	.06	.1		10	7.7		
1115	9551	17.2C	8.8	200	.21	.01	2.44	.05	2.52	.12	.06	.09		24.0	175	0	4.9	C	
					8	0	90	2	90	4	2	3							
08/26/59	5050	68.0F			3.2	.0	61	.8	136	7.0	2.0	.6	.1	.0		8	9.4		
	5000	20.0C	8.1	278	.16	.00	2.65	.02	2.72	.15	.06	.01		28.0	184	0	5.3		
					6	0	94	1	93	5	2	0							
07/28/60	5050	70.0F			4.6	.1	61	.8	132	5.8	1.8	5.7	.12	.0		12	7.7		
	5050	21.1C	8.1	275	.23	.01	2.65	.02	2.64	.12	.05	.09		25.0	184	0	5.6		
					8	0	91	1	91	4	2	3							
08/23/61	5050	65.0F			4.9	.2	60	.7	134	3.3	.4	6.1	.12	.1		13	7.2		
	5050	18.3C	8.3	274	.24	.02	2.61	.02	2.68	.07	.01	.10		25.0	181	0	5.5		
					8	1	90	1	94	2	0	3							

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR ASAR	REM
			PH	EC	CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SiO2	TDS SUM	TH NCH		

	G G-12 G-12.8		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA															
	43N/16E-20R01 M																	
07/11/62	5050	68.0F	8.6		6.0	.0	60	.9	132	4.1	2.1	6.9	.12	.3	184	15	6.7	
0830	5050	20.0C	8.3	274	.30	.00	2.61	.02	2.64	.09	.06	.11		24.0	183	0	5.5	
					10	0	89	1	91	3	2	4						
08/06/63	5050				4.2	.0	59	.6	130	3.8	2.5	5.3	.0	.2	186	11	7.7	
	5050		8.2	263	.21	.00	2.57	.02	2.60	.08	.07	.09		20.0	173	0	5.3	
					8	0	92	1	92	3	2	3					E	
07/15/64	5050				--	--	59	--	131	--	1.5	--	--	--		17		
	5050		8.5	283			2.57		2.62		.04		--	--			S	
							88											
08/15/65	5050	65.0F			--	--	62	--	131	--	1.9	4.1	--	--		19		
	5050	18.3C	8.6	290			2.70		2.62		.05	.07	--	--			S	
							88											
08/30/66	5050			259	--	--	--	--	--	--	--	--	--	--				
1210	0000																	
08/09/67	5050	65.0F			--	--	60	--	--	--	3.0	--	--	--		17		
1350	5050	18.3C	8.5	273			2.61				.08		--	--			S	
							88											
07/21/70	5050	62 F	8.2	295	12	1.7	56	.8	142	3.8	3.9	5.1	.0	.1	181	37	4.0	
1035	5050	17 C	8.3	281	.60	.14	2.44	.02	2.84	.08	.11	.08		--	168	0	5.0	
					19	4	76	1	91	3	4	3						
09/14/71	5050	63 F	7.8	292	--	--	--	--	--	--	--	--	--	--			S	
1420	0000	17 C											--	--				
09/13/72	5050	63.0F	7.8	315	--	--	--	--	--	--	--	--	--	--			S	
1445	5050	17.2C											--	--				
08/01/73	5050	62.0F	7.9	295	--	--	--	--	--	--	--	--	--	--			S	
0745	0000	16.7C											--	--				
07/17/74	5050	73.0F	7.9	290	--	--	--	--	--	--	--	--	--	--			S	
1135	0000	22.8C											--	--				

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN					MILLIGRAMS PER LITER				MILLIGRAMS PER LITER					REM
			LABORATORY PH	EC	CA	MG	NA	K	MILLIEQUIVALENTS PER LITER				B	F	TDS SUM	TH NCH	SAR ASAR		
									PERCENT	REACTANCE	VALUE								

	G		NORTH LAHONTAN HB																
	G-12		SURPRISE VALLEY HU																
	G-12.A		CEDARVILLE HA																
	43N/16E-20R01 M																		
08/13/75	5050	59.0F	7.8	320	27	1.1	41	1.1	154	4.9	3.3	5.0	.1	--	193	72	2.1		
1020	5050	14.4C	8.5	305	1.35	.09	1.78	.03	3.08	.10	.09	.08	--	--	176	0	3.3		
					42	3	55	1	92	3	3	2							
08/25/76	5050	57.0F	7.9	310	--	--	--	--	--	--	--	--	--	--					
1125	0000	13.9C											--	--					
																		S	
06/30/77	5050	57.0F	7.7	330	--	--	--	--	--	--	--	--	--	--					
1115	0000	13.9C											--	--					
																		S	
08/23/78	5050	64.0F	7.7	305	32	2.0	36	.6	160	5.0	.0	2.4	.0	--	201	88	1.7		
1130	5050	17.8C	8.3	315	1.60	.16	1.57	.02	3.20	.10	.00	.04	--	--	174	0	2.8		
					48	5	47	1	96	3	0	1							
07/11/79	5050	58.0F	7.7	315	--	--	--	--	--	--	--	--	--	--					
1125	0000	14.4C											--	--					
08/14/80	5050	63.0F	7.7	305	--	--	--	--	--	--	--	--	--	--					
1100	0000	17.2C											--	--					
08/12/81	5050	78.0F	8.6	195	3.0	.0	42	.4	88	--	2.0	--	--	--		8	6.9		
1105	5050	25.9C	8.1	199	.15	.00	1.83	.01	1.76		.06		--	--		0	2.5		
					8	0	92	1										S	
08/16/82	5050	69.0F	8.5	195	--	--	--	--	--	--	--	--	--	--					
1115	0000	20.5C											--	--					
08/22/83	5050	67.0F	9.3	203	2.0	.0	--	--	88	--	2.0	1.9	--	--		5			
1545	5050	19.4C	7.9	196	.10	.00			1.76		.06	.03	--	--		0			

MINERAL ANALYSES OF GROUND WATER

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DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR ASAP	REM

G G-12 G-12.R		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA															
06/07/58 1330	5050 9551	43N/16E-21R01 M	60.0F			9.0	.1	22	1.3	65	5.8	2.0	--	.01	.2	22	2.0
			15.5C	8.5	115	.45	.01	.96	.03	1.30	.12	.06		22.0	102	0	1.5
						31	1	66	2								
06/07/58 1310	5050 9551	43N/16E-22N01 M	57.0F			5.9	1.2	32	2.5	89	3.8	1.5	--	.14	.2	20	3.1
			13.9C	8.3	127	.29	.10	1.39	.06	1.78	.08	.04		37.0	138	0	2.5
						16	5	76	3								
06/07/58 1335	5050 9551	43N/16E-27N01 M	61.0F			4.0	.1	46	2.5	108	4.4	1.5	1.2	.26	.3	9	6.7
			16.1C	8.4	160	.20	.01	2.00	.06	2.16	.09	.04	.02	27.0	152	0	3.5
						9	0	88	3	94	4	2	1				
06/07/58 1350	5050 9551	43N/16E-27N02 M	59.0F			12	.4	34	3.6	104	4.3	.5	3.7	.30	.4	31	2.7
			15.0C	8.2	165	.60	.03	1.48	.09	2.08	.09	.01	.06	32.0	153	0	2.8
						27	1	67	4	93	4	0	3				
08/27/82 0915	5050 5050	43N/16E-28N01 M	62.0F	7.9	630	78	16	36	1.5	155	--	4.0	--	.1	.1	261	1.0
			16.7C	8.0	624	3.89	1.32	1.57	.04	3.10		.11	--		106	2.0	
						57	19	23	1								
06/15/83 1215	5050 5050	43N/16E-29C01 M	62.0F	7.6	800	99	22	--	--	160	251	5.0	--	--	--	338	
			16.7C	8.4	775	4.94	1.81			3.20	5.23	.14		--	178		
06/15/83 1330	5050 5050	43N/16E-29C01 M	59.0F	7.9	275	30	8.0	14	1.3	109	5.0	5.0	19.0	.0	--	172	108
			15.0C	8.2	267	1.50	.66	.61	.03	2.18	.10	.14	.31	--	148	0	0.6
						54	24	22	1	80	4	5	11				0.9
08/30/82 1510	5050 5050	43N/16E-29J01 M	72.0F	8.9	205	13	2.0	31	.5	98	--	5.0	--	.2	.2	40	2.1
			22.2C	7.8	209	.65	.16	1.35	.01	1.76		.14	--		0	2.3	
						30	7	62	0								

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM
			PH	EC	CA	MG	NA	K	CAC03	SO4	CL	NO3	TURB	SI02						

G		NORTH LAHONTAN HR																		
G-12		SURPRISE VALLEY HU																		
G-12.B		CEDARVILLE HA																		
43N/16E-29L01 M																				
06/15/83	5050	63.0F	7.7	240	25	5.0	20	.7	106	4.0	2.0	8.7	.1	--	154	83	1.0			
1340	5050	17.2C	8.2	236	1.25	.41	.87	.02	2.12	.08	.06	.14	--	--	129	0	1.4	S		
					49	16	34	1	88	3	3	6								
43N/16E-32K01 M																				
09/16/71	5050	66 F	8.3	245	13	2.8	39	.3	116	5.1	2.2	5.2	.1	--	164	44	2.6			
1415	5050	19 C	8.3	247	.65	.23	1.70	.01	2.32	.11	.06	.08	--	--	137	0	3.2			
					25	9	66	0	90	4	2	3								
09/13/72	5050	66.0F	8.2	275	--	--	--	--	--	--	--	--	--	--						
1430	0000	18.9C											--	--						
08/01/73	5050	64.0F	7.8	365	37	8.9	28	.4	171	8.2	4.3	12.0	.1	--	203	129	1.1			
0735	5050	17.8C	8.3	366	1.85	.73	1.22	.01	3.42	.17	.12	.19	--	--	201	0	2.0			
					49	19	32	0	88	4	3	5								
07/17/74	5050	67.0F	8.4	260	--	--	--	--	--	--	--	--	--	--						
1150	0000	19.4C											--	--						
08/13/75	5050		8.1	320	--	--	--	--	--	--	--	--	--	--						
1035	0000												--	--						
08/25/76	5050	66.0F	8.4	330	--	--	--	--	138	--	2.6	11.0	--	--		67				
1135	3050	18.9C	8.5	289					2.76		.07	.18	--	--				S		
06/30/77	5050	67.0F	8.4	295	19	3.0	41	.3	132	5.0	1.0	12.0	.1	--	184	60	2.3			
1130	5050	19.4C	8.5	298	.95	.25	1.78	.01	2.64	.10	.03	.19	--	--	161	0	3.3			
					32	8	60	0	89	3	1	6								
08/23/78	5050	66.3F	8.3	280	--	--	--	--	--	--	--	--	--	--						
1145	0000	18.9C											--	--						
07/11/79	5050	67.0F	8.4	260	--	--	--	--	--	--	--	--	--	--						
1140	0000	19.4C											--	--						
06/14/80	5050	67.0F	8.4	265	--	--	--	--	--	--	--	--	--	--						
1120	0000	19.4C											--	--						

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				REM		
* * * * *																		
G G-12 G-12.B		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE WA																
43N/16E-33M03 H		CONTINUED																
07/31/68 1330	0000 5050	61 F 16 C	7.9 455	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --				
07/17/69 0910	5050 5050	69.0F 20.5C	7.7 430 427	-- --	-- --	27 1.17 25	-- --	-- --	-- --	5.2 .15	25.0 .40	-- --	.2 --		180		S	
07/20/70 1830	5050 5050	64 F 18 C	7.7 420 411	44 2.20 48	11 .90 20	33 1.44 32	.7 .02 0	194 3.86 87	9.9 .21 5	4.2 .12 3	16.0 .26 6	.0 --	-- --	240 235	154 0	1.2 2.3		
09/14/71 1340	5050 5050	59 F 15 C	7.3 670 631	71 3.54 50	21 1.73 25	40 1.74 25	.8 .02 0	299 5.97 85	22 .46 7	14 .39 6	12.0 .19 3	.2 --	-- --	384 360	263 0	1.1 2.5		
09/13/72 1415	5050 5050	62.0F 16.7C	7.3 840 783	89 4.44 51	27 2.22 25	47 2.04 23	.4 .01 0	349 6.97 81	46 .96 11	19 .54 6	9.5 .15 2	.1 --	-- --	467 447	333 0	1.1 2.8		
08/01/73 0725	5050 0000	59.0F 15.0C	7.5 470	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --				S	
07/17/74 1155	5050 0000	65.0F 18.3C	7.3 540	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --				S	
08/13/75 1045	5050 5050	63.0F 17.2C	7.4 490 459	-- --	-- --	-- --	-- --	213 4.26	-- --	6.6 .19	18.0 .29	-- --	-- --		192		S	
08/25/76 1150	5050 0000	65.0F 18.3C	7.3 465	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --				S	
06/30/77 1135	5050 5050	60.0F 15.5C	7.8 480 488	54 2.69 52	15 1.23 24	28 1.22 24	.2 .01 0	227 4.54 89	12 .25 5	5.0 .14 3	11.0 .18 4	.0 --	-- --	286 261	196 0	0.9 1.9		
08/23/78 1155	5050 0000	62.0F 16.7C	7.9 480	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --	-- --					

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PFR LITER						REM

				CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH	SAR ASAR	REM	

		G 6-12 G-12.H		NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA														
		43N/16E-33M03 M		CONTINUED														
07/11/79 1150	5050 0000	66.0F 18.9C	8.4 260	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
,																		
08/14/80 1140	5050 5050	67.0F 19.4C	8.3 235 8.2 225	5.0 .25 11	.0 .00 0	48 2.09 69	.5 .01 0	108 2.16 93	5.0 .10 4	1.0 .03 1	2.0 .03 1	.1 --	--	146 126	12 0	6.0 3.9		
08/12/81 1125	5050 0000	67.0F 19.4C	8.6 215	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
08/18/82 1135	5050 0000	68.0F 20.0C	8.4 220	--	--	--	--	--	--	--	--	--	--	--	--	--	--	S
08/22/83 0840	5050 5050	68.0F 20.0C	8.4 190 192	4.0 .20 10	.0 .00 0	41 1.78 89	.5 .01 1	--	--	1.0 .03	--	--	--	--	10	0.0		
		43N/16E-33N02 M																
08/27/82 0750	5050 5050	60.0F 15.5C	8.2 235 7.8 234	14 .70 28	2.0 .16 6	37 1.61 64	1.1 .03 1	114 2.28	--	1.0 .03	--	--	--	--	43 0	2.5 3.0		
08/23/83 0810	5050 0000	62.0F 16.7C	8.2 225	--	--	--	--	--	--	--	--	--	--	--	--	--	--	S
		43N/16E-34P01 M																
09/09/58 1500	5050 5050	54 F 12 C	8.0 271	1.6 .08 3	1.9 .16 6	56 2.44 89	2.4 .06 2	134 2.68 99	1.0 .02 1	.5 .01 0	.2 .00 0	.09 51.0	.1	195	12 0	7.0 5.2		
		43N/17E-17N01 M																
08/26/59 1110	5050 5000	64.0F 17.8C	8.2 688	8.0 .40 6	2.4 .20 3	137 5.96 90	3.6 .09 1	184 3.68 55	69 1.44 21	56 1.58 23	2.2 .04 1	.9 47.0	.7	436	30 0	10.9 13.2		

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER							
				CA	MG	NA	K	PERCENT CACO3	REACTANCE SO4	VALUE CL	NO3	TURB	B SID2	F	TDS SUM	TH NCH	SAR ASAR	REM	

G		NORTH LAHONTAN HB																	
G-12		SURPRISE VALLEY HU																	
G-12.B		CEDARVILLE HA																	
43N/17E-16001 M																			
10/21/82	5050	136.4F	8.3	1670	28	1.0	317	9.5	67	--	212	--	5.4	5.8		74	16.0		
0930	5050	58.0C	7.9	1670	1.40	.08	13.79	.24	1.34		5.98		--	--		7	17.4	S	
					9	1	89	2											
06/16/83	5050	127.4F	8.6	1775	27	1.0	--	--	67	387	216	--	--	--		72			
1355	5050	53.0C	8.1	1640	1.35	.08			1.34	8.06	6.09	--	--	--		5		S	
43N/17E-20001 M																			
09/16/71	5050	64 F	8.0	585	--	--	--	--	154	--	49	--	--	--		33			
1230	5050	18 C	8.4	601					3.08		1.38		--	--				S	
09/13/72	5050	65.0F	8.4	675	--	--	--	--	--	--	--	--	--	--					
1610	0000	18.3C																	
08/14/75	5050	65.0F	8.2	645	--	--	--	--	156	--	49	5.7	--	--		28			
1030	5050	18.3C	8.4	610					3.12		1.38	.09	--	--				S	
06/30/77	5050	73.0F	8.5	700	--	--	--	--	--	--	--	--	--	--				S	
1325	0000	22.8C																	
08/24/78	5050	52.0F	8.5	700	--	--	--	--	--	--	--	--	--	--				S	
0730	0000	11.1C																	
07/11/79	5050	72.0F	9.4	710	--	--	--	--	--	--	--	--	--	--				S	
1330	0000	22.2C																	
																		S	
08/13/81	5050	9.1	790	9.0	2.0	166	4.9	225	72	68	4.8	1.3	--	536	30	13.2			
1000	5050	8.2	809	.45	.16	7.22	.13	4.50	1.50	1.92	.08	--	--	463	0	16.9			
				6	2	91	2	56	19	24	1								

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MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR	REM

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

[illegible]

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MINERAL ANALYSES OF GROUND WATER

[illegible]

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAR	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR ASAR	REM
				CA	MG	NA	K	CACO3	SD4	CL	NO3	TURB	B SI02	F	TDS SUM		

	G G-12 G-12.C		NORTH LAHONTAN HB SURPRISE VALLEY HU FORT BOWELL HA														
	43N/16E-06R02 M																
08/06/85 1555	5050 0000	54.0F 12.2C	7.4 215	--	--	--	--	--	--	--	--	--	--	--			
																	S
	43N/16E-08R01 M																
09/13/71 1510	5050 5050	69.0F 20.5C	7.2 280 275	--	--	--	--	125 2.50	--	2.8 .08	--	--	--		126		
																	S
09/13/72 1455	5050 5050	69.0F 20.5C	7.4 312	32 1.60 48	13 1.07 32	15 .65 19	.8 .02 1	137 2.74 84	6.9 .14 4	7.2 .20 6	12.0 .19 6	.0 --	--	201 169	135 0	0.6 1.0	
129 08/01/73 0810	5050 0000	69.0F 20.5C	7.1 310	--	--	--	--	--	--	--	--	--	--				S
07/17/74 1100	5050 0000	61.0F 16.1C	6.9 330	--	--	--	--	--	--	--	--	--	--				S
08/13/75 1105	5050 0000	66.0F 18.9C	7.0 325	--	--	--	--	--	--	--	--	--	--				S
08/25/76 1110	5050 0000	63.0F 17.2C	7.0 330	--	--	--	--	--	--	--	--	--	--				S
06/30/77 1055	5050 5050	58.0F 14.4C	6.9 355	37 1.85 52	13 1.07 30	14 .61 17	.5 .01 0	156 3.12 87	10 .21 6	2.0 .06 2	12.0 .19 5	.1 --	--	236 182	146 0	0.5 0.9	T
08/23/78 1115	5050 0000	70.0F 21.1C	7.1 290	--	--	--	--	--	--	--	--	--	--				
07/11/79 1120	5050 0000	59.0F 15.0C	7.1 320	--	--	--	--	--	--	--	--	--	--				
08/14/80 1105	5050 0000	61.0F 16.1C	7.0 335	--	--	--	--	--	--	--	--	--	--				

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAR	TEMP	FIELD LABORATORY P4 EC	MINERAL CONSTITUENTS IN					MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE					MILLIGRAMS PER LITER							
				CA	MG	NA	K	CAC03	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH	SAP ASAR	RFM				

	G G-12 G-12.C		NORTH LAHONTAN HR SURPRISE VALLEY HW FORT RIDWELL HA																		
	42N/16E-08D01 M																				
08/12/81 1055	5050 0000	73.0F 22.8C	7.2 360	--	--	--	--	--	--	--	--	--	--								
08/18/82 1100	5050 5050	65.0F 18.3C	7.1 351	40 2.00	14 1.15	16 .70	.9 .02	146 2.92	--	4.0 .11	--	--	--		158 12	0.6 1.0	S				
08/22/83 1305	5050 5050	68.0F 20.0C	7.1 460	53 2.64	20 1.64	--	--	192 3.84	--	6.0 .17	14.0 .23	--	--		214 22		S				
	43N/16E-08E01 M																				
08/31/82 1045	5050 5050	55.0F 12.8C	7.3 285	30 1.50	9.0 .74	16 .70	.8 .02	135 2.70	--	1.0 .03	--	.1 --	.1 --		112 0	0.7 1.1	S				
08/22/83 1520	5030 0000	54.0F 12.2C	7.1 305	--	--	--	--	--	--	--	--	--	--								
	44N/15E-24B01 M																				
05/07/53 1503	5050 5050	190 F 88 C	8.4 1520	30 1.50	2.4 .20	290 12.62	14 .36	204 4.08	253 5.27	176 4.96	.8 .01	4.8 99.9	5.9 99.9	1000 993	85 0	13.7 22.4	S				
	44N/15E-25D01 M																				
09/10/58 1506	5050 5050	52 F 11 C	7.6 198	21 1.05	8.6 .71	6.6 .29	.9 .02	97 1.94	1.8 .04	1.0 .03	2.1 .03	.04 32.0	.0 132	132	88 0	0.3 0.5					
	44N/15E-36B02 M																				
06/14/58 1640	5050 5050	50.0F 10.0C	7.7 156	9.2 .46	10 .82	5.8 .25	1.6 .04	75 1.50	.0 .60	1.1 .03	2.9 .05	.06 42.0	.4 118		66 0	0.3 0.4					

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	PEM
			PH	EC	CA	MG	NA	K	PERCENT REACTANCE VALUE				R	F	TURB	SiO2				
									CACO3	SO4	CL	NO3								

	G G-12 G-12.C				NORTH LAHONTAN HB SURPRISE VALLEY HU FORT RIDWELL HA															
	44N/15E-36D01 M																			
08/23/78	5050	48.0F	7.4	175	14	8.0	5.0	1.6	80	1.2	.0	.3	.0	--		110	68	0.3	F	
1010	5050	8.9C	8.0	155	.70	.66	.22	.04	1.60	.02	.00	.00	--			78	0	0.3	T	
					43	41	14	2	99	1	0	0								
	44N/15E-36F02 M																			
09/14/71	5050	64 F	6.8	130	--	--	4.5	--	68	--	2.4	--	--	--			65			
1100	5050	18 C	7.3	134			.20		1.36		.07		--						S	
							13													
09/14/72	5050	55.0F	6.8	112	--	--	--	--	--	--	--	--	--	--						
0735	0000	12.8C																		
08/01/73	5050	58.0F	6.7	110	--	--	--	--	--	--	--	--	--	--						
0930	0000	14.4C																		
07/17/74	5050	59.0F	6.7	110	14	3.2	4.5	.9	62	1.6	.0	.3	.0	--		89	48	0.3	F	
(955	5050	15.0C	7.5	107	.70	.26	.20	.02	1.24	.03	.00	.00	--			62	0	0.3	T	
					59	22	17	2	98	2	0	0								
08/23/78	5050	52.0F	6.7	135	13	4.0	4.0	.6	59	.0	.0	1.2	.0	--		95	49	0.2	F	
1020	5050	11.1C	7.6	116	.65	.33	.17	.02	1.18	.00	.00	.02	--			58	0	0.3	T	
					56	28	15	2	98	0	0	2								
08/14/80	5050	53.0F	6.4	125	--	--	--	--	--	--	--	--	--	--						
1025	0000	11.7C																	S	
08/12/81	5050	67.0F	6.7	130	--	--	--	--	--	--	--	--	--	--					S	
1000	0000	19.4C																		
08/18/82	5050	60.0F	6.7	120	--	--	--	--	--	--	--	--	--	--					S	
1010	0000	15.5C																		

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER								REM													

																		CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	B	F	TDS SUM	TH NCH	SAR ASAR	REM	

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLE LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN	MILLIGRAMS PER LITER				MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAR ASAR	REM
			LABORATORY PH	FC		CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SiO2	TDS SUM	TH NCH		

	G G-12 G-12.C		NORTH LAHONTAN HB SURPRISE VALLEY HU FORT BOWWELL HA																
	45N/16E-17D01 M																		
08/30/66	5050 0000			279	--	--	--	--											
07/21/70	5050 1145	59 F 15 C	7.1 7.5	288 277	34 1.70 56	10 .82 27	10 .44 15	2.0 .05 2	140 2.80 96	3.8 .08 3	1.0 .03 1	1.5 .02 1	.0 --	169 146	128 0	0.4 0.7			
09/13/71	5050 1600	58 F 14 C	7.1	260	--	--	--	--	--	--	--	--	--	--	--	--			
08/01/73	5050 1015	59.0F 15.0C	7.1	285	--	--	--	--	--	--	--	--	--	--	--	--			
07/17/74	5050 0855	61.0F 16.1C	7.1	260	--	--	--	--	--	--	--	--	--	--	--	--			
08/13/75	5050 0905	60.0F 15.5C	7.1 8.4	275 263	31 1.55 54	10 .82 29	10 .44 15	2.1 .05 2	134 2.68 94	3.8 .08 3	2.5 .07 2	2.1 .03 1	.0 --	165 142	119 0	0.4 0.7			
08/25/76	5050 0945	62.0F 16.7C	7.0	265	--	--	--	--	--	--	--	--	--	--	--	--			
06/30/77	5050 0935	60.0F 15.5C	7.1 8.3	310 294	--	--	--	--	145 2.90	--	2.7 .08	1.6 .03	--	--	134				
08/23/79	5050 0940	62.0F 16.7C	7.0	320	--	--	--	--	--	--	--	--	--	--	--	--			
07/11/79	5050 0950	59.0F 15.0C	7.1	285	--	--	--	--	--	--	--	--	--	--	--	--			
08/14/80	5050 0910	62.0F 16.7C	7.0	275	--	--	--	--	--	--	--	--	--	--	--	--			

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM			
			LABORATORY PH	EC	CA	MG	NA	K	MILLIEQUIVALENTS PER LITER		PERCENT REACTANCE VALUE		TURB	SI02									

G-12 G-12.C			NORTH LAHONTAN HB SURPRISE VALLEY MU FORT BOWELL HA																				
45N/16E-17D01 M			CONTINUED																				
08/12/81	5050	62.0F	6.9	280	34	10	10	2.0	142	--	1.0	--	--	--			126	0.4					
0820	5050	16.7C	8.2	275	1.70	.82	.44	.05	2.84		.03		--	--			0	0.7	S				
					56	27	15	2															
08/18/82	5050	62.0F	7.1	265	--	--	--	--	--	--	--	--	--	--									
0830	0000	16.7C												--					S				
08/23/83	5050	67.0F	8.1	290	--	--	--	--	--	--	--	--	--	--									
1420	0000	19.4C												--					S				
08/09/84	5050	63.0F	7.2	265	--	--	--	--	--	--	--	--	--	--									
1020	0000	17.2C												--					S				
08/06/85	5050	61.0F	7.2	260	--	--	--	--	--	--	--	--	--	--									
1510	0000	16.1C												--					S				
45N/16E-17M01 M																							
06/06/88	5050	128 F	7.9	1560	23	3.8	320	12	334	132	222	.3	5.9	2.0	1060	73	16.3						
1533	5000	53 C			1.15	.31	13.92	.31	6.67	2.75	6.26	.00	99.9		1019	0	29.0						
					7	2	89	2	43	18	40	0											
45N/16E-19J01 M																							
08/31/82	5050	66.0F	8.6	640	1.0	.0	159	2.1	311	--	15	--	1.2	2.1			2	48.9					
1345	5050	18.9C	8.4	642	.05	.00	6.92	.05	6.21		.42		--	--			0	12.6	S				
					1	0	99	1															
45N/16E-19001 M																							
06/06/88	5050	66.0F		26	9.0	27	5.0	113	7.1	7.0	--	.08	.3		102	1.2							
1530	9551	18.9C	8.4	230	1.30	.74	1.17	.13	2.26	.15	.20		46.0	196	0	1.8							
					39	22	35	4										S					
08/26/89	5050			27	9.4	27	4.0	157	8.0	7.0	.0	.1	.3	219	106	1.1							
	5000		8.2	295	1.35	.77	1.17	.10	3.14	.17	.20	.00	48.0	225	0	2.0		E					
					40	23	35	3	89	5	6	0											
07/28/80	5050	65.0F		26	9.2	28	3.1	156	6.7	3.7	.8	.09	.2	218	103	1.2							
	5050	18.3C	8.2	299	1.30	.76	1.22	.08	3.12	.14	.10	.01	47.0	218	0	2.1		F					
					39	23	36	2	93	4	3	0											

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				SAP ASAR	REM
			LABORATORY PH	EC	CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SI02	TDS SUM	TH NCH		

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM
				CA	MG	NA	K	PERCENT REACTANCE VALUE				B TURR	F SI02	CL	NO3				
								CACO3	SO4	CL	NO3								

	G G-12 G-12.C		NORTH LAHONTAN HB SURPRISE VALLEY HD FORT RIDWELL HA																
	45N/16E-19001 M																		
08/01/73 0950	5050 0000	65.0F 18.3C	8.0 320	--	--	--	--	--	--	--	--	--	--	--	--				
07/17/74 0925	5050 5050	65.0F 16.3C	7.9 300 8.1 310	--	--	27 1.17 35	--	160 3.20	--	4.4 .12	--	--	--	--		107			
08/13/75 0920	5050 0000	64.0F 17.8C	7.9 320	--	--	--	--	--	--	--	--	--	--	--				S	
08/25/76 0950	5050 0000	64.0F 17.8C	8.0 320	--	--	--	--	--	--	--	--	--	--	--					
06/30/77 0950	5050 5050	64.0F 17.8C	8.1 340 8.6 345	26 1.30 38	10 .82 24	29 1.26 37	2.4 .06 2	161 3.22 93	6.0 .12 3	4.0 .11 3	.0 .00 0	.1 --	--	--	219 174	106 0	1.2 2.1	T	
08/23/78 0950	5050 0000	63.0F 17.2C	8.0 315	--	--	--	--	--	--	--	--	--	--	--					
07/11/79 1000	5050 0000	64.0F 17.8C	8.0 320	--	--	--	--	--	--	--	--	--	--	--					
08/14/80 0925	5050 0000	63.0F 17.2C	7.9 335	--	--	--	--	--	--	--	--	--	--	--					
08/12/81 0945	5050 0000	64.0F 17.8C	8.1 320	--	--	--	--	--	--	--	--	--	--	--					
08/18/82 0935	5050 5050	63.0F 17.2C	8.0 325 8.6 326	23 1.15 35	10 .82 25	28 1.22 37	3.3 .08 2	151 3.02	--	2.0 .06	--	--	--	--		98 0	1.2 2.1	S	
08/23/83 1235	5050 0000	64.0F 17.8C	7.9 318	--	--	--	--	--	--	--	--	--	--	--					

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH	EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER					SAR ASAR	PFM
					CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	F SiO2	TDS SUM	TH MCH			

	G G-12 G-12.C		NORTH LAHONTAN HR SURPRISE VALLEY HU FORT RIDWELL HA																
	45N/16E-19001 M		CONTINUED																
08/09/84 1035	5050 0000	67.0F 19.4C	7.9	315	--	--	--	--	--	--	--	--	--	--					
08/06/85 1520	5050 0000	65.0F 18.3C	8.0	315	--	--	--	--	--	--	--	--	--	--					
10/21/82 1445	5050 5050		8.4 8.9	1400 1400	1.0 .05 0	.0 .00 0	306 13.31 99	5.6 .14 1	354 7.07	--	166 5.25	--	2.8	1.8 --			2 0	94.2 24.0	
06/14/88 1539	45N/16E-30F01 M 5050 5050	58 F 14 C	8.1	314	36 1.80 52	7.0 .58 17	23 1.00 29	3.2 .08 2	162 3.24 96	2.8 .06 2	2.6 .07 2	1.5 .02 1	.08	.6 42.0	216 215	119 0	0.9 1.7		
	45N/17E-31E01 M 5050 5050		8.5 8.2	598 582	2.0 .10 2	1.0 .08 1	129 5.61 94	6.2 .16 3	193 3.86	--	40 1.13	--	1.0	1.0 --			9 0	18.7 13.4	
	46N/16E-02001 M 5050 5050	62.0F 16.7C	7.7	365 359	24 1.20 34	8.0 .66 19	35 1.52 43	5.5 .14 4	92 1.84	--	22 .62	--	.3	.4 --			03 1	1.6 2.3	
08/23/83 1310	5050 0000	59.0F 15.0C	7.3	357	--	--	--	--	--	--	--	--	--	--					
09/01/82 1325	5050 5050	60.0F 15.5C	7.3 7.8	445 446	15 .75 17	5.0 .41 9	69 3.00 69	7.4 .19 4	127 2.54	--	29 .82	--	.3	.5 --			58 0	3.9 5.4	
08/23/83 1325	5050 5050	59.0F 15.0C	7.3	355 348	22 1.10 32	8.0 .66 19	36 1.57 45	5.2 .13 4	--	--	20 .56	--	--	--			88	0.0	

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAR	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				TDS	TH	SAR	REM

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER							REM

				CA	MG	NA	K	CAC03	SO4	CL	NO3	TURB	B	F	TDS SUM	TH NCH	SAR ASAR	REM	

G		NORTH LAHONTAN HA																	
G-12		SURPRISE VALLEY HU																	
G-12.C		FORT RIDWELL HA																	
46N/16E-07F01 M																			
09/13/60	5050	92.0F		4.0	2.4	78	6.8	106	56	21	.6	.63	1.4		20	7.6			
1700	5050	33.3C	6.0 400	.20	.20	3.39	.17	2.12	1.17	.59	.01				309	0	6.3		
				5	5	86	4	54	30	15	0								
46N/16E-08R02 M																			
09/14/71	5050	60.0F	7.5 238	5.8	2.3	41	3.5	98	10	4.8	3.9	.2	--		203	24	3.6	F	
0930	5050	15.5C	7.8 228	.29	.19	1.78	.09	1.96	.21	.14	.06		--		130	0	3.3	T	
				12	8	76	4	83	9	6	3								
07/17/74	5050	66.0F	7.4 220	--	--	--	--	--	--	--	--	--	--						
0725	0000	18.9C																	
08/13/75	5050	65.0F	7.3 230	--	--	--	--	94	--	4.8	5.8	--	--			22			S
0745	5050	18.3C	8.2 230					1.88		.14	.09		--						
06/30/77	5050	64.0F	7.5 245	--	--	--	--	--	--	--	--	--	--						S
0850	0000	17.8C																	
07/11/79	5050	63.0F	7.4 225	5.0	2.0	41	--	96	--	3.0	--	--	--		20	4.0			
0745	5050	17.2C	8.4 229	.25	.16	1.78		1.92		.08			--		0	3.3			S
				11	7	81													
08/12/81	5050	65.0F	7.5 230	--	--	--	--	--	--	--	--	--	--						
0730	0000	18.3C																	
08/18/82	5050	63.0F	7.4 220	--	--	--	--	--	--	--	--	--	--						
0740	0000	17.2C																	
08/23/83	5050	65.0F	7.3 220	--	--	--	--	--	--	--	--	--	--						
1220	0000	18.3C																	
08/09/84	5050	66.0F	7.4 220	5.0	2.0	40	--	98	--	4.0	--	.2	--		20	3.9			
0925	5050	18.9C	8.1 230	.25	.16	1.74		1.76		.11			--		0	3.1			
				12	7	81													
08/06/85	5050	64.0F	7.4 220	--	--	--	--	--	--	--	--	--	--						S
1405	0000	17.8C																	

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER B F TDS TH SAR REM						
				CA	MG	NA	K	CAC03	SO4	CL	NO3	TURB	SiO2	TDS SUM	TH NCH	SAR ASAR	REM	

G G-12 G-12.C		NORTH LAHONTAN HB SURPRISE VALLEY HU FORT RIDWELL HA																
46N/16E-08R03 M																		
09/14/71	5050	54 F	6.5	425	32	20	13	2.5	74	12	15	98.0	.2	--	332	162	0.4	F
0920	5050	12 C	7.7	416	1.60	1.64	.57	.06	1.48	.25	.42	1.58	--	--	237	88	0.7	T
				41	42	15	2	40	7	11	42							
07/17/74	5050	54.0F	6.5	365	30	21	12	2.1	109	13	5.8	75.0	.0	--	292	161	0.4	F
0725	5050	12.2C	7.9	396	1.50	1.73	.52	.05	2.18	.27	.16	1.21	--	--	224	53	0.7	T
				39	46	14	1	57	7	4	32							
08/13/75	5050	53.0F	6.9	335	--	--	--	--	--	--	--	--	--	--				
0750	0060	11.7C																
08/25/76	5050	56.0F	6.4	220	16	11	9.2	1.7	78	6.9	1.0	26.0	.0	--	171	85	0.4	F
0915	5050	13.3C	8.2	221	.80	.90	.40	.04	1.56	.14	.63	.42	--	--	119	7	0.6	T
				37	42	19	2	73	7	1	20							
06/30/77	5050	54.0F	6.6	345	--	--	--	--	--	--	--	--	--	--				
0855	0000	12.2C																
08/23/78	5050	52.0F	6.5	220	--	--	--	--	--	--	--	--	--	--				
0915	0030	11.1C																
07/11/79	5050	57.0F	6.7	280	21	14	--	--	110	--	2.0	17.0	--	--			S	
0740	5050	13.9C	8.3	265	1.05	1.15			2.20	--	.06	.27	--	--	110			
													0					
08/14/80	5050	53.0F	6.4	220	--	--	--	--	--	--	--	--	--	--				
0750	0000	11.7C																
08/12/81	5050	55.0F	6.5	220	--	--	--	--	--	--	--	--	--	--				
0733	0000	12.8C																
08/18/82	5050	54.0F	6.4	210	--	--	--	--	--	--	--	--	--	--				
0735	0000	12.2C																
08/23/83	5050	53.0F	6.7	220	--	--	--	--	--	--	--	--	--	--				
1215	0000	11.7C																

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				SAR	REM

G G-12 G-12.C		NORTH LAYONTAN HB SURPRISE VALLEY HU FORT RIDWELL HA															
46N/16E-08R03 M		CONTINUED															
08/09/84	5050	54.0F	6.7	258	20	13	11	--	104	--	3.0	--	.1	--		104	0.5
0920	5051	12.2C	8.0	262	1.00	1.07	.48		2.08		.09		--			0	0.7
					39	42	19										S
08/06/85	5050	52.0F	6.7	245	--	--	--	--	--	--	--	--	--	--			
1410	0000	11.1C															
46N/16E-09N01 M																	
06/06/88	5050	60.0F			4.5	4.6	38	7.5	94	18	7.5	1.1	.24	.8		30	3.0
1220	9551	15.5C	7.9	180	.22	.38	1.65	.19	1.88	.37	.21	.02		64.0	202	0	3.0
					9	16	68	8	76	15	8	1					C
46N/16E-03B01 M																	
09/01/82	5050	63.0F	7.3	185	28	8.0	10	.7	82	--	1.0	--	.1	.1		103	0.4
1400	5050	17.2C	7.7	187	1.40	.66	.44	.02	1.64		.03			--		21	0.6
					56	26	17	1									S
46N/16E-12F01 M																	
09/01/82	5050	67.0F		460	12	4.0	76	11	139	--	29	--	.5	.6		46	4.0
1225	5050	19.4C	8.0	462	.60	.33	3.31	.28	2.78		.82			--		0	6.4
					13	7	73	6									S
46N/16E-13C01 M																	
06/14/88	5050	52.0F			37	15	40	8.8	213	26	15	--	.46	.4		153	1.4
1250	9551	11.1C	7.9	350	1.85	1.23	1.74	.23	4.26	.54	.42			50.0	321	0	2.8
					37	24	34	5									S
08/26/89	5050				38	15	47	7.2	217	20	12	.1	.3	.4	326	155	1.6
	5060		8.1	464	1.90	1.23	2.04	.18	4.34	.42	.34	.00		55.0	325	0	3.3
					36	23	38	3	85	8	7	0					S
07/28/60	5050				37	14	47	5.6	212	24	12	.3	.37	.3	320	150	1.7
	5050		8.4	469	1.85	1.15	2.04	.14	4.24	.50	.34	.00		53.0	320	0	3.3
					36	22	39	3	83	10	7	0					
08/26/61	5050	65.0F			37	14	44	5.6	212	26	12	.4	.33	.4	320	151	1.6
	5050	18.3C	7.9	466	1.85	1.15	1.91	.14	4.24	.54	.34	.01		52.0	319	0	3.1
					37	23	38	3	83	11	7	0					
07/11/62	5050	59.0F	7.4		39	13	44	5.8	209	23	13	1.0	.36	.6	321	153	1.5
1120	5050	15.0C	8.2	478	1.95	1.07	1.91	.15	4.18	.48	.37	.02		52.0	316	0	3.1
					38	21	38	3	83	10	7	0					

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLED LAB	TEMP	FIELD		MINERAL CONSTITUENTS IN	MILLIGRAMS PER LITER				MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM
			LABORATORY PH	EC		CA	MG	NA	K	PERCENT CACO3	REACTANCE SO4	CL	VALUE NO3	TURB	B SID2	F					

	G		NORTH LAHONTAN HB																		
	G-12		SURPRISE VALLEY HW																		
	G-12.C		FORT RIDWELL HA																		
	46N/16F-15B01 M																				
06/14/58	5050	53.0F			16	5.7	14	5.0	93	4.4	3.0	--	.12	.3		63	0.8				
1315	5050	11.7C	8.1	145	.80	.47	.61	.13	1.86	.09	.08			54.0	159	0	1.0		S		
					40	23	30	6													
	46N/16E-16B01 M																				
09/01/82	5050	56.0F	7.0	245	17	9.0	17	6.2	110	--	4.0	--	.1	.2		80	0.8				
1020	5050	13.3C	8.0	242	.85	.74	.74	.16	2.20		.11		--	--		0	1.2		S		
					34	30	30	6													
	46N/16F-16B01 M																				
09/14/71	5050	50 F	6.3	142	--	--	--	--	62	--	1.9	--	--	--		51					
1030	5050	10 C	7.5	139					1.24		.05		--	--					S		
08/01/73	5050	52.0F	6.5	155	--	--	--	--	--	--	--	--	--	--							
1045	0000	11.1C											--	--					S		
08/13/75	5050	54.0F	6.7	180	16	5.4	11	2.1	74	9.5	3.7	3.1	.0	--	107	62	0.6				
0830	5050	12.2C	8.0	172	.80	.44	.48	.05	1.48	.20	.10	.05		--	95	0	0.7				
					45	25	27	3	81	11	5	3									
08/25/76	5050	56.0F	6.3	190	--	--	--	--	--	--	--	--	--	--							
0855	0000	13.3C											--	--					S		
06/30/77	5050	53.0F	6.3	175	--	--	--	--	--	--	--	--	--	--							
0910	0000	11.7C											--	--					S		
08/23/78	5050	53.0F	6.4	165	16	6.0	12	1.8	76	6.0	3.2	2.9	.0	--	116	64	0.7				
0925	5050	11.7C	7.7	176	.80	.49	.52	.05	1.52	.12	.09	.05		--	93	0	0.8				
					43	26	28	3	85	7	5	3									
07/11/79	5050	54.0F	6.3	150	--	--	--	--	--	--	--	--	--	--							
0915	0000	12.2C											--	--							
08/14/80	5050	53.0F	6.3	175	--	--	--	--	--	--	--	--	--	--							
0840	0000	11.7C											--	--							

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER				MILLIGRAMS PER LITER							REM	
				CA	MG	NA	K	PERCENT REACTANCE VALUE			TURB	F SID2	TDS SUM	TH NCH	SAR ASAR					
								CAO3	SO4	CL						NO3				

	G G-12 G-12.C		NORTH LAHONTAN HR SURPRISE VALLEY HUI FORT BIDWELL HA																	
	46N/16E-16M01 M																			
08/12/81 0800	5050 0000	59.0F 15.0C	6.5 175	--	--	--	--	--	--	--	--	--	--							
06/18/82 0810	5050 0000	56.0F 13.3C	6.4 180	--	--	--	--	--	--	--	--	--	--							
08/23/83 1045	5050 5050	53.0F 11.7C	6.5 160 158	13 .65 41	5.0 .41 26	11 .48 30	2.1 .05 3	--	--	2.0 .06	--	--	--			53	0.0		S	
08/09/84 0945	5050 0000	53.0F 11.7C	6.4 185	--	--	--	--	--	--	--	--	--	--						S	
08/06/85 1315	5050 0000	53.0F 11.7C	6.5 180	--	--	--	--	--	--	--	--	--	--						S	
	46N/16E-17A01 M																			
07/25/86 1557	5050 5050		7.8 249	6.6 .33 12	3.9 .32 12	43 1.87 70	5.5 .14 5	102 2.04 79	14 .29 11	8.0 .23 9	.8 .01 0	.10 67.0	.8	211 210	32 0	3.3 3.5				
09/14/71 1115	5050 5050	59 F 15 C	7.3 360 8.0 360	--	--	54 2.35 70	--	108 2.16	--	17 .48	--	--	--			51			S	
08/01/73 1030	5050 0000	59.0F 15.0C	7.5 375	--	--	--	--	--	--	--	--	--	--							
08/25/76 0925	5050 5050	61.0F 16.1C	7.6 355 8.2 367	9.6 .48 14	4.9 .40 11	57 2.48 70	6.4 .16 5	107 2.14 61	42 .87 25	18 .51 14	.8 .01 0	.5	--	262 203	44 0	3.7 4.4	E T			
06/30/77 0920	5050 0000	61.0F 16.1C	7.4 375	--	--	--	--	--	--	--	--	--	--							

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH FC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER						SAR	REM					
										CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	F SIO2	TDS SUM	TH NCH	ASAR		

G G-12 G-12.C		NORTH LA MONTAN HB SURPRISE VALLEY HU FORT RIDWELL HA																						
46N/16E-20R01 M																								
08/12/81	5050	60.0F	7.5	345	9.0	5.0	57	6.1	107	CONTINUED														
0645	5050	15.5C	8.1	349	.45	.41	2.48	.16	2.14	--	16	--	.4	--						43	3.8			
					13	12	71	5			.45	--	--							0	4.5		S	
08/18/82	5050	60.0F	7.4	330	--	--	--	--	--	--	--	--	--	--										
0810	0600	15.5C																						
08/09/84	5050	61.0F	7.5	340	--	--	--	--	--	--	--	--	--	--										
0955	0000	16.1C																						
08/06/85	5050	61.0F	7.4	330	--	--	--	--	--	--	--	--	--	--										
1300	0000	16.1C																						
46N/16E-21R01 M																								
06/02/56	5050	56.0F			8.7	4.0	33	4.5	97	11	4.3	1.5	.10	.8					38	2.3				
1615	5000	13.3C	7.4	220	.43	.33	1.44	.12	1.94	.23	.12	.02		56.0	181			0	2.6					
					19	14	62	5	84	10	5	1												
46N/16E-21R06 M																								
06/14/58	5050	54.0F			9.7	3.6	24	5.0	84	8.2	4.5	2.2	.16	.5					39	1.7				
1340	9551	12.2C	8.1	153	.48	.30	1.04	.13	1.68	.17	.13	.04		55.0	163			0	1.8			C		
					25	15	53	7	83	8	6	2												
46N/16E-23R01 M																								
07/11/62	5050	54.0F			7.8	7.8	17	4.3	98	21	13	.8	.10	.2	217			97	0.8			F		
	5050	12.2C	8.3	276	.39	.64	.74	.11	1.96	.44	.37	.01		53.0	184			0	1.1			S		
					21	34	39	6	71	16	13	0												
08/17/65	5050	55.0F			5.6	5.6	20	4.4	104	22	15	1.6	.1	--	226			108	0.8			F		
	5050	12.8C	8.5	316	.28	.46	.67	.11	2.08	.46	.42	.03		--	137			0	1.3			TC		
					16	27	51	6	70	15	14	1										S		
08/30/66	5050				6.6	6.6	18	3.7	97	16	9.2	1.1	.1	--	182			82	0.9			F		
	5050		8.3	251	.33	.54	.78	.09	1.94	.33	.26	.02		--	119			0	1.2			T		
					19	31	45	5	76	13	16	1										S		
08/09/67	5050	54 F			--	--	18	--	101	--	16	--	--	--				111						
1545	5050	12 C	8.4	304			.78		2.02		.45		--	--								S		
							26																	

MINERAL ANALYSES OF GROUND WATER

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MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER				TDS SUM	TH NCH	SAR ASAR	REM
				CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	F SiO2						

	G G-12 G-12.C		NORTH LA MONTAN HB SURPRISE VALLEY HU FORT BOWELL HA																
	46N/16E-23801 M																		
07/11/79 0815	5050 0000	55.0F 12.8C	7.8 380	--	--	--	--	--	--	--	--	--	--	--					
08/14/80 0825	5050 0000	54.0F 12.2C	7.7 375	--	--	--	--	--	--	--	--	--	--	--					
08/12/81 0715	5050 0000	54.0F 12.2C	7.8 375	--	--	--	--	--	--	--	--	--	--	--					
08/18/82 0715	5050 0000	54.0F 12.2C	7.7 380	--	--	--	--	--	--	--	--	--	--	--					
	46N/16E-24001 M																		
06/14/58 1230	5050 9551	56.0F 13.3C	8.3 175	21 1.05 44	6.9 .57 24	16 .70 29	3.7 .09 4	94 1.88 76	14 .29 12	9.5 .27 11	1.3 .02 1	.16 63.0	.3		192	82 0	0.8 1.1	C	
	46N/16E-25802 M																		
06/14/58 1145	5050 9551	66.0F 18.9C	8.3 330	22 1.10 24	8.8 .72 16	55 2.39 53	11 .28 6	146 2.92 62	38 .79 17	34 .96 20	2.2 .04 1	.48 63.0	.4		322	92 0	2.5 4.1	C S	
08/26/59 1145	5050 5000	68.0F 20.0C	8.2 368	16 .80 21	5.8 .48 13	53 2.31 60	9.4 .24 6	120 2.40 64	36 .75 20	22 .62 16	.1 .00 0	.4 71.0	.5		286	64 0	2.9 4.0		
07/28/60 1150	5050 5050	69.0F 20.5C	8.2 430	19 .95 23	8.1 .67 16	55 2.39 57	9.2 .21 5	134 2.68 63	37 .77 18	28 .79 18	2.3 .04 1	.85 64.0	.4		303	81 0	2.7 4.1		
08/22/61 0920	5050 5050	68.0F 20.0C	8.3 441	22 1.10 24	8.3 .68 15	60 2.61 57	9.6 .22 5	141 2.82 75.	3.6 .07 2	29 .82 22	1.7 .03 1	.45 62.0	.5		280	89 0	2.8 4.4	S	
08/06/63 1120	5050 5050		8.3 420	21 1.05 24	8.0 .66 15	58 2.52 57	8.9 .23 5	146 2.92 67	33 .69 16	25 .71 16	1.3 .02 0	.3 57.0	.4		320 300	86 0	2.7 4.4	E	

MINERAL ANALYSES OF GROUND WATER

DATE	SAMPLER	TEMP	FIELD	LABORATORY	MINERAL	CONSTITUENTS	IN	MILLIGRAMS	PER LITER	MILLIEQUIVALENTS	PER LITER	MILLIGRAMS	PER LITER	TDS	TH	SAR	REM	
TIME	LAR			PH	EC	CA	MG	NA	K	PERCENT	REACTANCE	VALUE		TURR	F	SI02		
* * * * *	* * * * *																	
	G																	
	G-12																	
	G-12.C																	
	46N/16F-29E31 M																	
09/11/58	5050	55.0F				.8	.7	130	2.6	269	5.8	20	.3	.9	2.0	5	25.3	
1730	5000	12.8C	8.5	575	.04	.06	5.66	.07	5.37	.12	.96	.00		52.0	374	0	15.4	
					1	1	97	1	89	2	9	0					S	
08/26/59	5050	66.0F				.8	.2	136	2.6	263	6.0	1.8	2.4	.8	4.0	3	34.2	
1230	5030	18.9C	8.4	559	.04	.02	5.92	.07	5.25	.12	.05	.04		53.0	361	0	12.8	
					1	0	98	1	96	2	1	1					S	
07/26/60	5050	56.0F				1.2	.0	137	1.6	254	6.6	18	3.2	.72	2.2	3	34.4	
1020	5050	13.3C	8.4	550	.06	.00	5.96	.04	5.07	.14	.51	.05		51.0	372	0	12.3	
					1	0	98	1	88	2	9	1					S	
08/22/61	5050	56.0F				1.4	.1	133	1.7	272	4.6	20	3.2	.76	2.3	4	28.9	
1010	5050	13.3C	8.5	544	.07	.01	5.79	.04	5.43	.10	.56	.05		52.0	380	0	14.9	
					1	0	98	1	88	2	9	1					S	
08/06/63	5050	56.0F				.4	.0	130	1.9	240	9.1	17	3.1	.6	1.5	370	1	56.6
1157	5050	13.3C	8.5	520	.02	.00	5.66	.05	4.60	.19	.48	.05		41.0	347	0	7.9	
					0	0	99	1	87	3	9	1					S	
08/17/65	5050	56.0F				--	--	131	--	245	--	20	--	.70	1.5	10		
	5050	13.3C	8.6	588			5.70		4.90		.56			--			S	
							97											
08/30/66	5050				518	--	--	--	--	--	--	--	--	.7	--	518		
	5050													--	--			
	46N/16E-30K01 M																	
08/31/82	5050	60.0F	7.3	220	16	8.0	18	1.6	112	--	1.0	--	.0	.1	73	0.9		
1430	5050	15.5C	7.8	217	.80	.66	.78	.04	2.24		.03		--	--	0	1.3	S	
					35	29	34	2										
	46N/16E-31R01 M																	
06/14/58	5050	82 F	8.3	240	4.0	.3	62	7.5	99	32	18	1.0	.55	.9	256	11	8.1	
1615	5000	28 C			.20	.02	2.70	.19	1.98	.67	.51	.02		72.0	257	0	4.6	
					6	1	87	6	62	21	16	1						

MINERAL ANALYSES OF GROUND WATER

DATE TIME	SAMPLER LAB	TEMP	FIELD LABORATORY PH EC	MINERAL CONSTITUENTS IN				MILLIGRAMS PER LITER MILLIEQUIVALENTS PER LITER PERCENT REACTANCE VALUE				MILLIGRAMS PER LITER B F TDS TH SAR PEM TURB SID2 SUM NCH ASAR					
				CA	MG	NA	K	CACO3	SO4	CL	NO3	TURB	SID2	SUM	NCH	ASAR	PEM

G			NORTH LAHONTAN HR														
G-12			SURPRISE VALLEY HU														
G-12.C			FORT BOWELL HA														

46N/16E-32E01 M																	
08/31/32	505J	61.0F	7.7	260	13	6.0	34	4.0	126	--	3.0	--	.0	.2		57	2.0
1500	5050	16.1C	7.9	261	.65	.49	1.48	.10	2.52		.08			--		0	2.7
					24	18	54	4									

S

APPENDIX D

MINOR ELEMENT ANALYSES OF GROUND WATER

CONSTITUENTS IN MILLIGRAMS PER LITER

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MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ARSENIC	CONSTITUENTS BARIUM CADMIUM	IN MILLIGRAMS CHROM (ALL) CHROM (HEX)	PER LITER COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
<p>G-12 NORTH LAHONTAN HB G-12.A SURPRISE VALLEY HU 39N/17E-08P01 M RARE CREEK HA</p>												
08/09/67 0850	5050			66.0F	0.04 D	--	--	--	--	--	--	
39N/17E-29C02 M												
06/13/58 1336	5050 5000			76.0F	--	--	--	0.00 T	--	--	--	
39N/17E-29G M												
06/13/58 1221	5050 5050		170	76 F 8.4	--	--	--	0.00 T	--	--	--	
39N/17E-29G01 M												
06/13/58 1224	5050 5050		286	106 F 8.5	0.02 T	--	0.00 T	0.00 T	0.00 T	--	--	0.00 T
06/13/58 1325	5050 5000			106.0F	--	--	--	0.00 D	--	--	--	
39N/17E-33D04 M												
09/11/58 1227	5050 5050		319	109 F 9.0	0.00 T	--	0.00 T	0.00 T	0.00 T	--	--	0.00 T
40N/16E-25R01 M												
06/13/58 1239	5050 5050		180	56 F 8.3	--	--	--	0.00 T	--	--	--	
40N/16E-36F M												
06/13/58 1242	5050 5050		230	56 F 8.5	--	--	--	0.00 T	--	--	--	
40N/16E-36F01 M												
06/13/58 1415	5050 5000			56.0F	--	--	--	0.00 T	--	--	--	
07/10/62 1000	5050 5050			58.0F 7.3	0.00 D	--	--	0.00 D 0.01 T	0.00 D 0.01 D	--	--	0.00 D
08/09/67 0945	5050				0.01 D	--	--	--	--	--	--	

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *
	G											
	G-12											
	G-12.4											
	40N/16E-36G			M								
05/07/59	5050			56 F		--	--	--				
1245	5050		340	7.9	--	--	--	0.01 T	--	--	--	
	40N/16E-36G01			M								
07/16/69	5050			57.0F		--	--	--				
1015			280	7.3	0.00 D	--	--	--	--	--	--	
	40N/17E-1PNO1			M								
06/16/59	5050			58 F		--	--	--				
1248	5050		155	8.5	--	--	--	0.00 T	--	--	--	
	40N/17E-20C01			M								
09/11/58	5050			55 F		--	--	--				
1254	5050		370	7.6	--	--	--	0.01 T	--	--	--	
07/10/62	5050			56.0F		--	--	0.00 D	0.00 D	--	--	
1035	5050			7.6	0.00 D	--	--	0.02 T	00.5 D	--	0.00 D	
08/15/65	5050			55.0F		--	--	--	--	--	--	
									0.04 D	--	--	
	40N/17E-30H01			M								
09/09/58	5050			64 F		--	--	--				
1257	5050		552	7.7	--	--	--	0.00 T	--	--	--	
	40N/17E-30P03			M								
08/25/82	5050			67.0F		--	--	--				
0850	5050		310	7.8	0.00 T	--	--	--	--	--	--	
	40N/17E-31M01			M								
09/09/58	5050			53 F		--	--	--				
1300	5050		228	8.0	--	--	--	0.00 T	--	--	--	

MINDR ELEMENT ANALYSES OF GROUND WATER

DATE	SAMP	DEPTH	DISCH	TEMP	CONSTITUENTS IN MILLIGRAMS PER LITER										LEAD	MERCURY	SILVER	ZINC	REM
TIME	LAR		EC	PH	ARSENIC	BARIUM	CHROM (ALL)	COPPER	IRON	MANGANESE	SELENIUM	ZINC							
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *			
G-12				NORTH LAHONTAN HB															
G-12.A				SURPRISE VALLEY HU															
40N/17E-31P01 M				BARE CREEK HA															
06/30/77	5050		375	59.0F		--	--	0.00	T	0.00	T	--	--						
1600				7.0	0.00	T	--	--	0.02	T	0.00	T	--	--	0.00	T			
40N/17E-32E01 M																			
09/11/58	5050		217	60 F	--	--	--	--	--	--	--	--	--						
1303	5050			8.0	--	--	--	0.00	T	--	--	--	--						
G-12.B				CEDARVILLE HA															
40N/16E-11G01 M																			
09/09/58	5050		222	54 F	--	--	--	--	--	--	--	--	--						
1230	5050			8.0	--	--	--	0.00	T	--	--	--	--						
07/10/62	5050			56.0F		--	--	0.01	D	0.00	D	--	--						
1153	5050			7.6	0.00	D	--	0.00	T	0.01	D	--	--	0.03	D				
40N/16E-13J01 M																			
06/02/56	5050			55.0F	--	--	--	--	--	--	--	--	--						
1310	5000				--	--	--	0.02	T	--	--	--	--						
06/02/56	5050			55.0F	--	--	--	--	--	--	--	--	--						
1325	5000				--	--	--	0.00	D	--	--	--	--						
40N/15E-13R01 M																			
06/02/56	5050		212	55 F	--	--	--	--	--	--	--	--	--						
1233	5000			7.3	--	--	--	0.02	T	--	--	--	--						
06/13/58	5050			54.0F	--	--	--	--	--	--	--	--	--						
1550	5000				--	--	--	0.00	T	--	--	--	--						
08/01/63	5050		230	54.0F		--	--	0.00	D	0.00	D	--	--						
0945	5050			7.7	0.00	D	--	0.01	T	0.00	D	--	--	0.00	D				
40N/16E-13R02 M																			
06/13/58	5050		165	54 F	--	--	--	--	--	--	--	--	--						
1235	5050			8.5	--	--	--	0.00	T	--	--	--	--						

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	CONSTITUENTS IN MILLIGRAMS PER LITER												LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
* * *	* * *	* * *	* * *	* * *	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON												
G			NORTH LAHONTAN HB																	
G-12			SURPRISE VALLEY HU																	
G-12.8			CEDARVILLE HA																	
41N/16E-04601 M																				
06/14/58	5050			58 F		--	--	--												
1306	5050		160	8.3	--	--	--	0.00	T	--										
07/10/62	5050			59.0F		--	--	0.00	D	0.00	D									
1303	5050			8.2	0.01	D	--	0.00	T	0.00	D	--				0.00	D			
41N/16E-13N01 M																				
06/14/58	5050			58 F		--	--	--												
1312	5050		330	8.2	--	--	--	0.00	T	--										
08/26/59	5050			58.0F		--	--	--												
0940	5000				--	--	--	0.00	D	--										
41N/16E-23P01 M																				
06/14/58	5050			59 F		--	--	--												
1315	9551		140	8.3	--	--	--	0.02	T	--										
41N/16E-25C01 M																				
06/14/58	5050			56 F		--	--	--												
1318	9551		143	8.4	--	--	--	0.00	T	--										
41N/16E-25C03 M																				
06/14/58	5050			56.0F		--	--	--												
1400	5050				--	--	--	0.00	T	--										
07/10/62	5050			58.0F		--	--	0.00	D	0.00	D									
1215	5050			8.3	0.01	D	--	0.00	T	0.00	D	--				0.00	D			
08/30/66	5050					--	--	--												
1000					0.02	D	--	--		--										
41N/16E-34H01 M																				
06/14/58	5050			40 F		--	--	--												
1321	9551		75	8.0	--	--	--	0.00	T	--										

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAR	DEPTH	DISCH EC	TEMP PH	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
G NORTH LAHONTAN HR G-12 SURPRISE VALLEY HU G-12.8 CEDARVILLE HA 41N/16E-35D01 M												
06/14/58 1324	5050 9551		128	50 F 8.0	--	--	--	0.22 T	--	--	--	
41N/16E-35D02 M												
08/30/66 0953	5050				0.00 D	--	--	--	--	--	--	
41N/16E-35K01 M												
06/14/58 1327	5050 9551		140	64 F 7.8	--	--	--	0.00 T	--	--	--	
42N/16E-03P01 M												
07/13/54 1355	5050 5060			53.5F	--	--	--	0.00 T	--	--	--	
42N/16E-04P01 M												
06/13/58 1333	5050 9551		260	52 F 8.9	--	--	--	0.00 T	--	--	--	
07/10/62 1435	5050 5050			56.0F 7.4	0.00 D	--	--	0.00 D 0.03 T	0.00 D 0.00 D	--	0.00 D	
08/14/75 0930	5050 5050		320	59.0F 7.2	--	0.00 T	--	0.00 T 0.11 T	0.00 T 0.00 T	--	0.00 T	
42N/16E-05R01 M												
09/10/58 1336	5050 5050		395	54 F 7.7	--	--	--	0.00 T	--	--	--	
42N/16E-06L02 M												
08/26/59 0910	5050 5060			50.0F	0.00 T	--	0.00 T	0.01 T 0.00 D	0.00 T 0.00 T	--	0.00 T	

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
<p>G NORTH LAHONTAN HB G-12 SURPRISE VALLEY HU G-12.8 CF DARVILLE HA 42N/16E-06R01 M</p>												
06/13/58 1339	5050 9551		245	58 F 6.3	--	--	--	0.00 T	--	--	--	
42N/16E-06R02 M												
06/13/58 1205	5050 5000			58.0F	--	--	--	0.00 T	--	--	--	
07/10/62 1410	5050 5050			53.0F 6.8	0.02 D	--	--	0.00 D 0.00 T	0.00 D 0.01 D	--	0.00 D	
08/30/66 1105	5050 1105				0.00 D	--	--	--	--	--	--	
42N/16E-08E01 M												
06/13/58 1342	5050 9551		135	53 F 7.4	--	--	--	0.00 T	--	--	--	
08/11/67 0930	5050 5050				0.00 D	--	--	--	--	--	--	
42N/16E-08F01 M												
08/11/67 1030	5050 1030				0.00 D	--	--	--	--	--	--	
42N/16E-09R01 M												
09/09/58 1345	5050 5050		794	61 F 7.9	--	--	--	0.00 T	--	--	--	
42N/16E-10P01 M												
09/09/58 1110	5050 5050			54.0F	--	--	--	0.00 T	--	--	--	
42N/16E-10P02 M												
09/09/58 1348	5050 5050		354	54 F 8.1	--	--	--	0.00 T	--	--	--	

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH FC	TEMP PH	ARSENIC	CONSTITUENTS BARIUM CADMIUM	IN MILLIGRAMS CHROM (ALL) CHROM (HEX)	PER LITER COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
G G-12 G-12.B 42N/16E-17J01 M NORTH LAHONTAN HQ SURPRISE VALLEY HU CEDARVILLE HA												
09/09/58 1351	5050 5050		157	60 F 8.1	--	--	--	0.00 T	--	--	--	
42N/16E-21L01 M												
06/14/58 1354	5050 9551		175	55 F 7.9	--	--	--	0.00 T	--	--	--	
07/10/62 1345	5050 5050			57.0F 8.2	0.00 D	--	--	0.00 D 0.00 T	0.00 D 0.00 D	--	0.00 n	
42N/16E-28M01 M												
06/14/58 1357	5050 9551		185	58 F 8.3	--	--	--	0.00 T	--	--	--	
42N/16E-29H01 M												
09/11/58 1403	5050 5050		240	55 F 8.4	--	--	--	0.01 T	--	--	--	
42N/16E-33J01 M												
06/14/58 1403	5050 9551		165	50 F 7.5	--	--	--	0.11 T	--	--	--	
42N/16E-33M03 M												
09/09/58 0850	5050 5050			64.0F	--	--	--	0.00 T	--	--	--	
42N/16E-34F01 M												
06/14/58 1406	5050 9551		200	58 F 8.3	--	--	--	0.00 T	--	--	--	
07/10/62 1330	5050 5050			61.0F 8.4	0.01 D	--	--	0.01 D 0.02 T	0.00 D 0.01 D	--	0.00 D	
08/30/66 1030	5050		331		0.00 D	--	--	--	--	--	--	

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
G NORTH LAHONTAN HB G-12 SURPRISE VALLEY HU G-12.8 CEDARVILLE HA 42N/16E-34P01 M												
09/09/58	5050			54.0F	--	--	--	--	--	--	--	
0950	5050				--	--	--	0.00 T	--	--	--	
42N/17E-06A01 M												
06/02/56	5050			56 F	--	--	--	--	--	--	--	
1409	5000		468	8.5	--	--	--	0.25 T	--	--	--	
42N/17E-06L01 M												
05/07/59	5050			184.0F	--	--	--	--	--	--	--	
0930	5050				--	--	--	0.00 D	--	--	--	
05/07/59	5050			184 F	--	--	0.00 T	0.00 T	0.00 T	--	--	
1412	5050		1410	7.5	0.00 T	--	--	0.02 T	0.00 T	--	0.00 T	
42N/17E-06P01 M												
08/13/54	5050			198.0F	--	--	00.0 T	0.01 T	0.00 T	--	--	
1315	5000				0.19 T	--	--	0.00 D	0.0 T	--	0.01	
08/30/82	5050			76.0C	--	--	--	--	--	--	--	
1610	5050		1390	8.5	0.22 T	--	--	--	--	--	--	
42N/17E-10H01 M												
08/26/59	5050			52.0F	--	--	00.0 T	0.01 T	0.00 T	--	--	
1535	5000				0.07 T	--	--	0.02 D	0.19 T	--	0.10	
43N/16E-04H01 M												
09/10/58	5050			57.0F	--	--	--	--	--	--	--	
1310	5050				--	--	--	0.00 T	--	--	--	
43N/16E-05N01 M												
08/26/59	5050			54 F	--	--	--	0.00	0.00	--	--	
	5050		223		0.00	--	0.00	0.00 T	0.00	--	0.00	

MINOR ELEMENT ANALYSES OF GROUND WATER

	DATE			SAMP LAB	DEPTH	DISCH EC	TEMP PH	CONSTITUENTS IN MILLIGRAMS PER LITER										LEAD			MERCURY		SILVER			REM
	*	*	*					ARSENIC	BARIUM	CADMIUM	CHROM (ALL)	CHROM (HEX)	COPPER	IRON	MANGANESE	SELENIUM	ZINC									

DATE TIME			SAMP LAR		DEPTH	DISCH EC	TEMP PH	ARSENIC		CONSTITUENTS BARIUM CADMIUM		IN MILLIGRAMS CHROM (ALL) CHROM (HEX)		PER LITER COPPER IRON		LEAD MANGANESE		MERCURY SELENIUM		SILVER ZINC		REM
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
G G-12 G-12.R 43N/16E-12D01 M																						
05/05/59		5050					184.0F					0.00	T	0.00	T	0.00	T	--		--		
1100		5050						0.39	T	--		--		0.02	T	0.01	T	--		0.05	T	
05/05/59		5050					184.0F					--		--	D	--		--		--		
1115		5050						--		--		--		0.00	D	--		--		--		
05/05/59		5050					184 F					0.00	T	0.00	T	0.00	T	--		--		
1430		5050			1670		8.0	0.39	T	--		--		0.02	T	0.00	T	--		0.05	T	
43N/16E-13D01 M																						
07/13/54		5050					100 F					0.00	T	0.00	T	0.00	T	--		--		
1433		5000			1780		7.8	0.36	T	--		--		0.04	T	0.10	T	--		0.12	T	
05/05/59		5050					104.0F					0.00	T	0.00	T	0.00	T	--		--		
1030		5050						0.36	T	--		--		0.04	T	0.10	T	--		0.12	T	
05/05/59		5050					104.0F					--		--	D	--		--		--		
1045		5050						--		--		--		0.00	D	--		--		--		
43N/16E-16L01 M																						
09/10/58		5050					6R F					0.00	T	0.00	T	0.00	T	--		--		
1439		5000			134		8.1	0.02	T	--		--		0.02	T	0.00	T	--		0.00	T	
43N/16E-20R01 M																						
06/07/58		5050					63 F					--		--		--		--		--		
1442		9551			200		8.8	--		--		--		0.00	T	--		--		--		
07/11/62		5050					68.0F					--		0.00	D	0.00	D	--		--		
0830		5050					8.6	0.01	D	--		--		0.00	T	0.00	D	--		0.00	D	
08/30/66		5050										--		--		--		--		--		
1210								0.00	D	--		--		--		--		--		--		
09/13/72		5050					63.0F					--		0.00	D	0.00	D	--		--		
1445		5050			315		7.8	0.00	D	0.00	D	--		0.01	D	0.00	D	0.00	D	0.03	D	

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MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH FC	TEMP PH	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
<p>G NORTH LAHONTAN HR G-12 SURPRISE VALLEY HU G-12.A CEDARVILLE HA 43N/16E-21R01 M</p>												
06/07/58 1443	5050 9551		115	60 F 8.5	--	--	--	-- 0.00 T	--	--	--	
43N/16E-22R01 M												
06/07/58 144A	5050 9551		127	57 F 8.3	--	--	--	-- 0.00 T	--	--	--	
43N/16E-27R01 M												
06/07/58 1451	5050 9551		160	61 F 8.4	--	--	--	-- 0.03 T	--	--	--	
43N/16E-27R02 M												
06/07/58 1454	5050 9551		165	59 F 8.2	--	--	--	-- 0.01 T	--	--	--	
43N/16E-33R03 M												
09/09/53 1457	5050 5050		263	64 F 8.1	--	--	--	-- 0.00 T	--	--	--	
08/26/59 1050	5050 5000			64.0F	0.03 T	--	00.0 T	0.01 T 0.00 D	0.00 T 0.00 T	--	0.00 T	
07/11/62 0815	5050 5050			63.0F 7.9	0.01 D	--	--	0.01 D 0.00 T	0.00 D 0.00 D	--	0.00 D	
06/30/66 1200	5050				0.00 D	--	--	--	--	--	--	
43N/16E-34R01 M												
09/09/58 1500	5050 5050		271	54 F 8.0	--	--	--	-- 0.00 T	--	--	--	
43N/17E-17R01 M												
08/26/59 1110	5050 5000			64.0F	0.58 T	--	00.0 T	0.02 T 0.06 D	0.00 T 0.00 T	--	0.00 T	

CONSTITUENTS IN MILLIGRAMS PER LITER

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MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
G NORTH LAHONTAN HR G-12 SURPRISE VALLEY HU G-12.C FORT RINWELL HA 43N/16E-06R02 M												
07/17/69	5050			56.0F		--	--	0.01 D	0.00 D	--	--	
6930	5050		220	7.3	0.00 D	--	--	0.02 D	0.00 D	--	0.12 D	
44N/15E-24R01 M												
05/07/59	5050			190 F		--	0.00 T	0.02 T	0.01 T	--	--	
1503	5050		1520	8.4	0.25 T	--	--	0.00 T	0.55 T	--	0.00 T	
44N/15E-25D01 M												
09/10/58	5050			52 F		--	--	--	--	--	--	
1506	5050		198	7.8	--	--	--	0.03 T	--	--	--	
44N/15E-36R02 M												
06/14/58	5050			50 F		--	--	--	--	--	--	
1509	5050		156	7.7	--	--	--	0.00 T	--	--	--	
44N/16E-06E01 M												
08/31/82	5050			68.0F		--	--	--	--	--	--	
1310	5050		2200	8.4	0.01 T	--	--	--	--	--	--	
44N/16E-06E02 M												
09/10/58	5050			77 F		--	0.00 T	0.00 T	0.00 T	--	--	
1512	5000		640	8.0	0.02 T	--	--	0.03 T	0.00 T	--	0.00 T	
07/11/62	5050			77.0F		--	--	0.00 D	0.00 D	--	--	
1000	5050			8.4	0.02 D	--	--	0.02 T	0.03 D	--	0.00 D	
08/30/66	5050					--	--	--	--	--	--	
1245					0.01 D	--	--	--	--	--	--	
44N/16E-29N01 M												
06/14/58	5050			62 F		--	--	--	--	--	--	
1515	5050		541	8.4	--	--	--	0.00 T	--	--	--	
08/30/66	5050					--	--	--	--	--	--	
1225					0.01 D	--	--	0.08 T	--	--	--	

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE			SAMP		DISCH	TEMP	CONSTITUENTS IN MILLIGRAMS PER LITER										LEAD		MERCURY		SILVER		ZINC		REM	
TIME	LAR	DEPTH	EC	PH			ARSENIC		BARIUM		CADMIUM		CHROM (ALL)		CHROM (HEX)		COPPER		IRON		MANGANESE		SELENIUM		ZINC	

DATE TIME	SAMP LAB	DEPTH	DISCH FC	TEMP PH	ARSENIC	CONSTITUENTS BARIUM CADMIUM	IN MILLIGRAMS CHROM (ALL) CHROM (HEX)	PER LITER COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REP
G G-12 G-12.C 45N/16E-19001 M NORTH LAHONTAN HR SURPRISE VALLEY MU FORT RIDWELL HA												
06/06/58 1540	5050 5000			66.0F	--	--	--	--	--	--	--	
07/11/62 1015	5050 5050			65.0F 8.1	0.01 D	--	--	0.00 D 0.00 T	0.000 D 0.08 D	--	--	D
08/30/66 1305	5050		294		0.01 D	--	--	-- 0.01 T	0.01 D --	--	--	
45N/16E-30F01 M												
06/14/58 1539	5050 5050		314	58 F 8.1	--	--	--	-- 1.2 T	--	--	--	
46N/16E-02R01 M												
09/01/82 1325	5050 5050		445	60.0F 7.3	0.00 T	--	--	--	--	--	--	
46N/16E-04K01 M												
09/10/58 1542	5050 5050		194	61 F 7.6	--	--	--	-- 0.00 T	--	--	--	
08/26/59 1100	5050 5000				0.00 T	--	0.00 T	0.01 T 0.00 D	0.00 T 0.00 T	--	--	T
07/11/62 1110	5050 5050			61.0F 7.4	0.00 D	--	--	0.00 D 0.00 T	0.00 D 0.02 D	--	--	D
46N/16E-09N01 M												
06/06/58 1545	5050 9551		180	60 F 7.9	--	--	--	-- 0.00 T	--	--	--	
46N/16E-13C01 M												
06/14/58 1548	5050 9551		350	52 F 7.9	--	--	--	-- 0.23 T	--	--	--	
07/11/62 1120	5050 5050			59.0F 7.4	0.01 D	--	--	0.00 D 0.09 T	0.00 D 0.13 D	--	--	D
08/30/66 1415	5050				0.00 D	--	--	--	--	--	--	

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DATE TIME	SAMP LAB	DEPTH	DISCH FC	TEMP PH	ARSENIC		CONSTITUENTS BARIUM CADMIUM		IN MILLIGRAMS CHROM (ALL) CHROM (HEX)		PER LITER COPPER IRON		LEAD MANGANESE		MERCURY SELENIUM		SILVER ZINC		REM
					*	*	*	*	*	*	*	*	*	*	*	*	*	*	
G G-12 G-12.C 46N/16E-14K01 M																			
09/10/58	5050			54 F															
1551	5050		216	7.7	--		--		--		0.16	T	--		--		--		
46N/16E-14R01 M																			
07/11/62	5050			54.0F							0.00	D	0.00	D			--		
1245	5050			7.8	0.01	D	--		--		0.00	T	0.00	D			--	0.00 D	
08/30/66	5050																		
1400					0.01	D	--		--		--		--		--		--		
46N/16E-15R01 M																			
06/14/58	5050			53 F															
1554	9551		145	8.1	--		--		--		0.00	T	--		--		--		
46N/16E-21R01 M																			
06/02/56	5050			56 F															
1600	5000		220	7.4	--		--		--		0.01	T	--		--		--		
46N/16E-21R06 M																			
06/14/58	5050			54 F															
1603	9551		153	8.1	--		--		--		0.01	T	--		--		--		
46N/16E-23R01 M																			
07/17/59	5050			56.0F															
1200			330	7.9	0.01	D	--		--		--		--		--		--		
46N/16E-24001 M																			
06/14/58	5050			56 F															
1606	9551		175	8.4	--		--		--		0.10	T	--		--		--		
46N/16E-25R01 M																			
06/14/58	5050			66 F															
1609	9551		330	8.3	--		--		--		0.00	T	--		--		--		

MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ARSENIC	BARIUM CADMIUM	CHROM (ALL) CHROM (HEX)	COPPER IRON	LEAD MANGANESE	MERCURY SELENIUM	SILVER ZINC	REM
G NORTH LAHONTAN HB G-12 SURPRISE VALLEY HU G-12.C FORT RIDWELL HA 46N/16E-25R02 M												
06/14/58	5050			66.0F								
1145	5050				--	--	--	0.0 T	--	--	--	
08/26/58	5050			68.0F			00.0 T	0.00 T	0.00 T	--	--	
1145	5000				0.00 T	--	--	0.00 D	0.00 T	--	0.00 T	
46N/16E-29E01 M												
09/11/58	5050			55 F			0.00 T	0.00 T	0.00 T	--	--	
1612	5000		575	8.5	0.00 T	--	--	0.11 T	0.00 T	--	0.00 T	
08/26/59	5050			66.0F			0.00 T	0.01 T	0.00 T	--	--	
1230	5000				0.02 T	--	--	0.09 D	0.00 T	--	0.01 T	
08/30/66	5050											
1500					0.00 D	--	--	--	0.01 D	--	--	
46N/16E-32E01 M												
08/31/82	5050			61.0F								
1500	5050		260	7.7	0.00 T	--	--	--	--	--	--	

SUPPLEMENTAL MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ALUMINUM	ANTIMONY BERYLLIUM	BISMUTH COBALT	GALLIUM GERMANIUM	LITHIUM MOLYBDENUM	NICKEL STRONTIUM	TITANIUM VANADIUM	REM
<p align="center">G NORTH LAHONTAN HB G-12 SURPRISE VALLEY HU G-12.A BARE CREEK HA 09N/17E-07A02 M</p>												
06/13/58	5050			126.0F		--	--	--	--	--	--	
1155	5000				0.20 T	--	--	--	--	--	--	
39N/17E-07A01 M												
06/13/58	5050			122 F		--	--	--	--	--	--	
1212	5050		445	8.6	0.13 T	--	--	--	--	--	--	
39N/17E-07A02 M												
06/13/58	5050			126 F		--	--	--	--	--	--	
1215	5050		484	8.6	0.02 T	--	--	--	--	--	--	
39N/17E-07A03 M												
06/13/58	5050			136 F		--	--	--	--	--	--	
1218	5050		482	8.2	0.21 T	--	--	--	--	--	--	
39N/17E-29G01 M												
06/13/58	5050			106 F		--	--	--	--	--	--	
1224	5050		286	8.5	0.12 T	--	--	--	--	--	--	
39N/17E-33D04 M												
09/11/58	5050			109 F		--	--	--	--	--	--	
1227	5050		319	9.0	0.09 T	--	--	--	--	--	--	
40N/16E-36F01 M												
07/10/62	5050			58.0F		--	--	--	--	--	--	
1000	5050			7.3	0.03 D	--	--	--	--	--	--	
40N/17E-20C01 M												
07/10/62	5050			56.0F		--	--	--	--	--	--	
1035	5050			7.6	0.03 D	--	--	--	--	--	--	

SUPPLEMENTAL MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ALUMINUM	ANTIMONY BERYLLIUM	ARSENIC COBALT	GALLIUM GERMANIUM	LITHIUM MOLYBDENUM	NICKEL STRONTIUM	TITANIUM VANADIUM	REM
<p>G NORTH LAHONTAN HR G-12 SURPRISE VALLEY HU G-12-A BARE CREEK HA 40N/17E-31P01 M</p>												
06/30/77	5050			59.0F		--	--	--	--	--	--	
1600	5050		375	7.0	0.0	T	--	--	--	--	--	
<p>G-12.B CEDARVILLE HA 40N/16E-11G01 M</p>												
07/10/62	5050			56.0F		--	--	--	--	--	--	
1150	5050			7.6	0.05	D	--	--	--	--	--	
<p>40N/16E-13R01 M</p>												
08/01/68	5050			54.0F		--	--	--	--	--	--	
0945	5050		230	7.7	0.08	D	--	--	--	--	--	
<p>41N/16E-04G01 M</p>												
07/10/62	5050			59.0F		--	--	--	--	--	--	
1300	5050			8.2	0.06	D	--	--	--	--	--	
<p>41N/16E-25C03 M</p>												
07/10/62	5050			58.0F		--	--	--	--	--	--	
1215	5050			8.3	0.01	D	--	--	--	--	--	
<p>42N/16E-04P01 M</p>												
07/10/62	5050			56.0F		--	--	--	--	--	--	
1435	5050			7.4	0.10	D	--	--	--	--	--	
<p>42N/16E-06L02 M</p>												
08/26/59	5050			50.0F		--	--	--	--	--	--	
0910	5000				0.09	T	--	--	--	--	--	
<p>42N/16E-06R02 M</p>												
07/10/62	5050			53.0F		--	--	--	--	--	--	
1410	5050			6.8	0.05	D	--	--	--	--	--	

SUPPLEMENTAL MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ALUMINUM	ANTIMONY BERYLLIUM	BISMUTH COBALT	GALLIUM GERMANIUM	LITHIUM MOLYBDENUM	NICKEL STRONTIUM	TITANIUM VANADIUM	REM
G 6-12 6-12.8 42N/16E-21101 M NORTH LAHONTAN HB SURPRISE VALLEY HU CEDARVILLE HA												
07/10/62	5050			57.0F		--	--	--	--	--	--	
1345	5050			8.2	0.04 D	--	--	--	--	--	--	
42N/16E-34F01 M												
07/10/62	5050			61.0F		--	--	--	--	--	--	
1330	5050			8.4	0.04 D	--	--	--	--	--	--	
42N/17E-06L01 M												
05/07/59	5050			184 F		--	--	--	--	--	--	
1412	5050		1410	7.5	0.35 T	--	--	--	--	--	--	
42N/17E-06P01 M												
08/13/54	5050			198.0F		--	--	--	--	--	--	
1315	5000				0.00 T	--	--	--	--	--	--	
42N/17E-10H01 M												
08/26/59	5050			52.0F		--	--	--	--	--	--	
1535	5000				0.18 T	--	--	--	--	--	--	
43N/16E-05N01 M												
08/26/59	5050			54 F		--	--	--	--	--	--	
	5050		223		0.22	--	--	--	--	--	--	
43N/16E-12D01 M												
05/05/59	5050			184 F		--	--	--	--	--	--	
1430	5000		1670	8.0	0.20 T	--	--	--	--	--	--	
43N/16E-13B01 M												
07/13/54	5050			100 F		--	--	--	--	--	--	
1433	5050		1780	7.8	0.20 T	--	--	--	--	--	--	
05/05/59	5050			104.0F		--	--	--	--	--	--	
1030	5050				0.20 T	--	--	--	--	--	--	

SUPPLEMENTAL MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ALUMINUM	CONSTITUENTS IN MILLIGRAMS PER LITER ANTIMONY BERYLLIUM	BISMUTH COBALT	GALLIUM GERMANIUM	LITHIUM MOLYBDENUM	NICKEL STRONTIUM	TITANIUM VANADIUM	REM
<p>G NORTH LAHONTAN HB G-12 SURPRISE VALLEY HU G-12.B CEDARVILLE HA 43N/16E-16L01 M</p>												
09/10/58	5050			68 F								
1439	5000		134	8.1	0.14 T	--	--	--	--	--	--	
43N/16E-20801 M												
07/11/62	5050			68.0F								
0830	5050			8.6	0.01 D	--	--	--	--	--	--	
43N/16E-33M03 M												
08/26/59	5050			64.0F								
1050	5000				0.15 T	--	--	--	--	--	--	
07/11/62	5050			63.0F								
0815	5050			7.9	0.00 D	--	--	--	--	--	--	
43N/17E-17N01 M												
08/26/59	5050			64.0F								
1110	5000				0.09 T	--	--	--	--	--	--	
<p>G-12.C FORT BIDWELL HA 43N/16E-03N01 M</p>												
08/26/59	5050			54.0F								
0845	5000				0.22 T	--	--	--	--	--	--	
43N/16E-06R02 M												
07/17/69	5050			56.0F								
0930	5050		220	7.3	0.03 D	--	--	--	--	--	--	
44N/15E-24801 M												
05/07/59	5050			190 F								
1503	5050		1520	8.4	0.15 T	--	--	--	--	--	--	
44N/16E-06E02 M												
09/10/58	5050			77 F								
1512	5000		640	8.0	0.20 T	--	--	--	--	--	--	
07/11/62	5050			77.0F								
1000	5050			8.4	0.00 D	--	--	--	--	--	--	

SUPPLEMENTAL MINOR ELEMENT ANALYSES OF GROUND WATER

DATE TIME	SAMP LAB	DEPTH	DISCH EC	TEMP PH	ALUMINUM	ANTIMONY BERYLLIUM	BISMUTH COBALT	GALLIUM GERMANIUM	LITHIUM MOLYBDENUM	NICKEL STRONTIUM	TITANIUM VANADIUM	REM
* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *	* * *
	G G-12 G-12.C 44N/17E-06E02 M											
09/10/58 1410	5050 5000			77.0F		--	--	--	--	--	--	
					0.20 T	--	--	--	--	--	--	
	45N/16E-17D01 M											
07/11/62 1030	5050 5050			62.0F 7.2		--	--	--	--	--	--	
					0.02 D	--	--	--	--	--	--	
	45N/16E-17M01 M											
06/06/58 1533	5050 5000			128 F 7.9		--	--	--	--	--	--	
			1560		0.16 T	--	--	--	--	--	--	
	45N/16E-17N01 M											
06/06/58 1335	5050 5000			128.0F		--	--	--	--	--	--	
					0.16 T	--	--	--	--	--	--	
	45N/16E-19Q01 M											
07/11/62 1015	5050 5050			65.0F 8.1		--	--	--	--	--	--	
					0.00 D	--	--	--	--	--	--	
	46N/16E-04K01 M											
08/26/59 1100	5050 5000					--	--	--	--	--	--	
					0.06 T	--	--	--	--	--	--	
07/11/62 1110	5050 5050			61.0F 7.4		--	--	--	--	--	--	
					0.02 D	--	--	--	--	--	--	
	46N/16E-13C01 M											
07/11/62 1120	5050 5050			59.0F 7.4		--	--	--	--	--	--	
					0.04 D	--	--	--	--	--	--	
	46N/16E-14R01 M											
07/11/62 1245	5050 5050			54.0F 7.8		--	--	--	--	--	--	
					0.04 D	--	--	--	--	--	--	

SUPPLEMENTAL MINOR ELEMENT ANALYSES OF GROUND WATER

DATE	SAMP	DISCH	TEMP	CONSTITUENTS IN MILLIGRAMS PER LITER										REMARKS
TIME	LAB	EC	PH	ALUMINUM	ANTIMONY	BISMUTH	GALLIUM	LITHIUM	NICKEL	TITANIUM				
* * *	* * *	* * *	* * *	* * *	BERYLLIUM	CORAL	GERMANIUM	MOLYBDENUM	STRONTIUM	VANADIUM	* * *	* * *		
	G													
	G-12													
	G-12.C													
	46N/16E-25R02 M													
08/26/59	5050		68.0F		--	--	--	--	--	--				
1145	5000			0.06 T	--	--	--	--	--	--				
	46N/16E-29E01 M													
09/11/58	5050		55 F		--	--	--	--	--	--				
1612	5000	975	8.5	0.40 T	--	--	--	--	--	--				
08/26/59	5050		66.0F		--	--	--	--	--	--				
1230	5000			0.37 T	--	--	--	--	--	--				
	46N/16E-31R01 M													
06/14/58	5050		82 F		--	--	--	--	--	--				
1615	9551	240	8.3	0.07 T	--	--	--	--	--	--				